

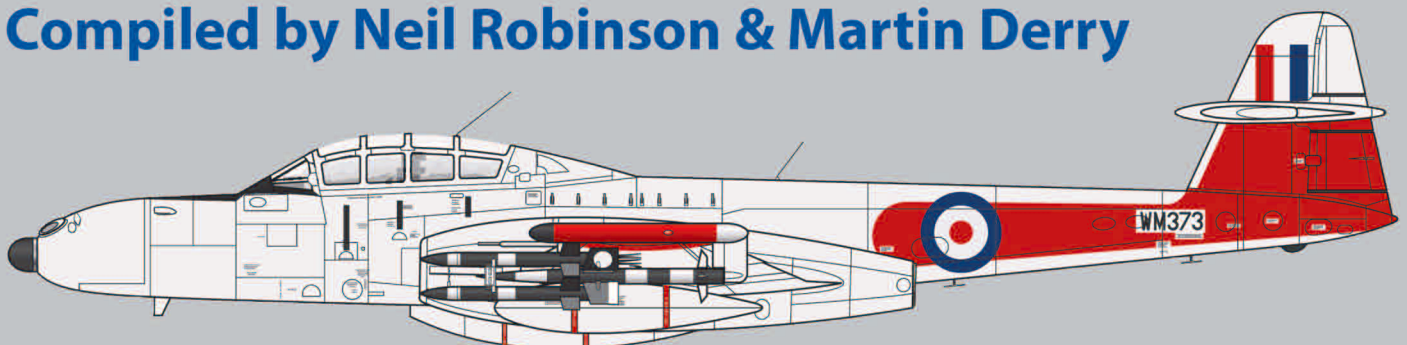
British Military Test and Evaluation Aircraft



The Golden Years
1945 - 1975



By Malcolm V Lowe
Illustrated by Mark Rolfe
Compiled by Neil Robinson & Martin Derry





FLIGHTCRAFT 'Special'

British Military Test and Evaluation Aircraft The Golden Years 1945-1975

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& Martin Derry**

Acknowledgements

We would like to express our thanks to all the people involved in producing 'British Military Test and Evaluation Aircraft The Golden Years 1945-1975' specifically Malcolm V Lowe for the background text, Mark Rolfe for the superb illustrations that have brought the many and varied colour schemes of these aircraft to life, and Steve Page of Page Design for his skill and patience in designing and laying out the pages.

Neil Robinson and Martin Derry, D&R Associates

All photos in this book via D&R Associates unless otherwise credited

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Above: Lancaster B.1 (FE), later PR.1, PA474 'M'. Seen while serving with the College of Aeronautics at Cranfield where it was employed to research boundary layer airflow using various wing sections fixed to the top of the fuselage. During September 1962, two gas turbine engines, used to suck boundary-layer air from the section under test (in this case a Handley Page laminar flow wing section) were installed – their exhausts are visible just forward of and below the fuselage roundel. Replaced by Lincoln RF342, PA474 was flown to 15 MU on 22 April 1964 and today flies on as part of the Battle of Britain Memorial Flight.

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Preface

The Second World War heralded a pace of change that none could have foreseen, even in 1939. In the space of six years, Great Britain had been catapulted headlong from the era of the biplane into that of the jet and missile. Sir Frank Whittle can lay claim to the birth and development of the turbojet; his company Power Jets Ltd, testing a running prototype as early as 1937. By 1945 the war was over, and the nation found itself dipping a toe into an ocean of new, promising and seemingly limitless technology. From this point on, technology moved apace rapidly. Much technology had been gleaned from development work carried out by Germany. Man was flying higher, faster and further than ever before, and had started to seriously look beyond the confines of this planet. The technology was there – the sky really was no longer the limit.

By 1950, Great Britain had tested the world's first jet airliner, the beautiful de Havilland Comet which entered service in 1952. The 1950s also saw the dawn of the 'V-Bomber Force'. These three designs really were the 'stuff of dreams' and captured many a young boy's imagination of the day.

Mention must also be made of the test pilots. The likes of John Derry, Jeffrey Quill, Peter Twiss, Geoffrey de Havilland and 'Bee' Beamont, who achieved an almost superstar status as they vied in competition at the prestigious Farnborough and Paris Air Shows. The Air Speed Record swung to and fro between Britain and the United States. No sooner had one nation broken a standing record, it was smashed by the other, only to be retaken again in as little as a month in some cases. The world's first fixed-wing jet-powered aircraft capable of vertical take off, hover and landing, the Hawker Siddeley Harrier entered service in the late 1960s. The world's first

commercial supersonic passenger transport, the Anglo-French Concorde took to the skies in 1969, stunning crowds around the globe.

Sadly though, this rate of development was not to remain, at least not in the United Kingdom, as political interference got in the way. A number of now notorious White Papers on Defence, issued by successive Labour and Conservative governments, curtailed or cancelled so many promising projects. Notable among these was the cancellation in 1966 of TSR.2, which still rankles deeply in many British aviation enthusiasts' minds. Perhaps with more political foresight and less 'intervention', the story would only just be beginning!

We have purposely chosen the first 30 years, The Golden Years, 1945 to 1975, as this was arguably the most exciting period with many wonderful and new types rubbing shoulders with wartime and immediate post-war designs that were utilised for development purposes, making for an eclectic mix of shapes and colour schemes.

Differing from previous Flight Craft book formats, the thrust of this 'Special' is very much on the colour schemes and markings of the aircraft involved, and as such there are many more full colour illustrations included, superbly executed by Mark Rolfe, who has deliberately included many of the lesser types along with those that are perhaps better known, in order to make the coverage as complete as possible. Coupled with Malcolm Lowe's informative background text, we trust that you find our collective efforts of use and interest.

Neil Robinson and Martin Derry



Perhaps epitomising the post-war British Aviation era as much as any other type, the English Electric Lightning was one of the country's success stories. However, even before Lightning single-seat fighters entered service the need for a two-seat training variant was appreciated and so the design of a dual-seat machine commenced in summer 1957. Known as the P.11, it was almost identical to production F.1 Lightnings except that the forward fuselage was widened by 11½ins to accommodate side by side seats and, other than the deletion of the F.1's nose cannon, the P.11 was as operationally capable as the single-seater. Two prototype P.11s were constructed with XL628 flying for the first time on 6 May 1959, and the second, XL629, on 21 October. At some point both were redesignated T.4 in line with the twenty production airframes that followed. This photo shows P.11, XL628, which crashed into the Irish Sea on 1 October 1959 after its fin broke away. Fortunately its pilot managed to eject even though the aircraft was flying supersonically at the time.

British Military Test and Evaluation Aircraft

The Golden Years 1945 - 1975



Above: In 1946 and 1947, Radlett Airfield became the venue of the SBAC show (Society of British Aircraft Constructors – later changed to Society of British Aerospace Companies) prior to the event moving to Farnborough in 1948 where it continues today as a biennial event. Among the 'heavies' on display in this September 1946 photo is the rear of a Bristol Freighter; Avro Lancastrian 'Nene' engine test bed VH742; Handley Page Hastings prototype TE580; Avro Tudor 1 G-AGRE (displaying its new, impressively tall, fin and rudder), with a white Avro Lincoln lying beyond. Nearest the camera is the second De Havilland DH 108, TG/306, which, just days later, on 27 September, broke up during an attempt on the world airspeed record killing its pilot Geoffrey de Havilland Jr. Beyond the DH 108 is DH Vampire F.1 TG285, DH Hornet PX313 and an unidentified DH Mosquito.

The testing of military (and civil) aircraft prior to their introduction into service is a vital task. No aircraft can go to war until it has been thoroughly tested and passed as fully serviceable and safe for day-to-day operation. The systems, equipment, electronics, avionics, weapons (where applicable), and the hundred and one other aspects that make up modern aircraft, all need to be completely and rigorously tested and checked in order to ensure that an aircraft of any type can be safely operated. Similarly, new concepts in aircraft design, aerodynamics or equipment need to be proven before they can be applied to real aircraft designs and manufacture.

In Britain, there is a long and noble tradition in the vital roles of experimentation in to new concepts and products, and in the separate but closely related testing of aircraft, their equipment and weapons. This tradition goes right back to the earliest days of aviation and continues to this day – albeit in a much reduced environment compared to the era that was the heyday of British flight testing in the 1940s, and the decades that followed it during the Cold War years.

As aircraft became more sophisticated and were used for a growing range of activities, so the necessity to properly test and ensure the safety of these aircraft for their occupants and operators gained ever-increasing importance. Allied to this was the need to develop safe and workable new designs and equipment, leading to research and development playing an ever-growing role in the technology of aviation.

These processes matured gradually, and in the early days much of the testing and proving of aircraft designs, their engines and primitive systems, was performed by the pioneer designers and early pilots themselves. The real catalyst was the start of World War One. In Britain, the earliest proper military aviation structure had effectively been born with the organisation of the Royal

Flying Corps (RFC) in April 1912. At almost exactly the same time, a Royal Aircraft Factory was established at Farnborough in Hampshire, and this location subsequently became central to the development of military aviation in Britain.

The Royal Aircraft Factory initially undertook the design as well as the manufacture of aircraft types destined for British military service. However, in the middle of World War One a number of important developments took place that altered these early arrangements and set the scene for the decades that followed in several key areas. Significant amongst these was the official decision to allow the growing aircraft industry outside the military, to increasingly have the primary role of actually developing and building new aircraft types, with the established facilities at Farnborough henceforth increasingly concentrating on research and development (R&D) issues in support of the outside aircraft designers. This set the scene for Farnborough to become a centre of excellence in aviation-related research and development, for which it became world-renowned for many decades to come. In 1918 the Royal Aircraft Factory was renamed the Royal Aircraft Establishment (RAE), a name that was to become famous and synonymous with Farnborough in the following decades.

The first official aircraft specification in Britain arose from the 1916 Cabinet-level Air Board structure to formulate and co-ordinate requirements based upon the needs of the RFC and the Royal Naval Air Service (RNAS). Issued during 1917, the aircraft design that met this requirement, Type A.1(a), was the Sopwith Snipe, which first flew in November 1917, and thus became the first British military aircraft to be designed and manufactured under this new specifications arrangement. Each new specification henceforth defined the requirements for the intended new design, and its layout, expected performance, engine(s), armament and basic equipment.

In the years to come this structure underwent a number of refinements, not least in nomenclature. In 1920 a new numerical notation was introduced, starting with Specification 1/20, (the little-known Bristol Type 37 triplane), then in 1927, role prefix letters were introduced, (starting with Specifications such as R.4/27 for a large multi-engine maritime patrol flying-boat). By World War Two, the established and well-known military specification system was thus in force and included such famous types as the Fairey Swordfish (Specification S.15/33), the Supermarine Spitfire (Specification F.37/34), and the de Havilland Mosquito (Specification B.1/40).

Originally, experimental and evaluation work for the RFC was carried out as a part of the RFC's Central Flying School (CFS) at Upavon in Wiltshire. In December 1914 an Experimental Flight for these purposes was established within the CFS, which was renamed as a Test Flight in the mid-war period. At that time the testing of airborne armament was moved from this Flight to the rather less-populated and more remote Orfordness in Suffolk. In early 1917 the test flight organisation was moved from Upavon to a new airfield at Martlesham Heath near Ipswich. This became known as the Aeroplane Experimental Station, and gradually began to re-absorb the armament testing from Orfordness. The name changed to Aeroplane Experimental Establishment in 1920, and finally, in 1924, the well-known title, Aeroplane and Armament Experimental Establishment (A&AEE) was adopted.

The A&AEE remained at Martlesham Heath throughout the inter-war period, gradually refining and developing its methods and procedures until it too, like Farnborough, became a centre of excellence within the scope of its testing criteria. On the outbreak of World War Two, however, the A&AEE was immediately moved from Martlesham Heath to Boscombe Down in Wiltshire. There the A&AEE grew into a vitally important organisation, and its structure, workforce and flight test organisation expanded massively to cope with the enormous amount of test and evaluation work that it had to carry out in support of Britain's aerial war effort.

Often forgotten, but equally as important as the aircraft, equipment, weapons system or concept that needs to be tested, is the actual person who flies the aircraft that is being tested or is carrying the equipment that is under test. Test pilots are amongst the finest and most capable members of the flying profession. Just as manufacturers require highly skilled and capable test pilots to make the initial flights of their new products, and to test every production example of a particular

type before it is delivered, so the organisations such as the RAE and A&AEE needed equally capable military (or occasionally civilian) pilots to perform their many and diverse tests.

In fact the vast majority of test pilots are, and always have been, military or ex-military pilots, and in Britain a specific organisation was created to train and increase the capabilities of these particularly talented pilots. This was the Empire Test Pilots School (ETPS), which began life in 1943 at Boscombe Down to train eligible skilled pilots for test flying duties within the armed forces and for the wider aircraft industry.

Up to that time, test pilots had learned their trade in a 'hands on' fashion through practical experience. The ETPS at once set very high standards – its first course began in June 1943 – although the ETPS name came into general use in 1944. In subsequent years the school went through a number of relocations, but its high quality of teaching persisted and was subsequently much imitated in other countries. Indeed, in addition to British and Commonwealth pilots, the ETPS itself has also been the centre of excellence for many foreign trainee test pilots as well.

These institutions continued to operate with continuing professionalism as the difficult transition to peace was made in the weeks, months and years after the end of the war. Great impetus was placed in the immediate post-war years in the development of jet engines and the search for safe supersonic flight, which made those years some of the busiest of all. Indeed, with the dawn of the Cold War, flight testing continued to be vitally important in verifying new concepts and weapons, in addition to preparing new designs for frontline service, and it was only with the 'thawing' of the Cold War in the later 1980s and into the 1990s that this situation began to radically change, with down-sizing and 'rationalisation' (cost-cutting) taking its considerable toll of Britain's test establishments, resulting in the closing of some facilities and the commercialisation of others.

Today, aircraft in general, and front-line combat aircraft in particular, have become ever more costly and complex, leading to design and development periods becoming much longer for individual types. At the same time the size of Britain's military services has continued to shrink, leading to far fewer new aircraft types coming into service – and those that are in service being considerably smaller in quantity, while computerisation of some aspects of design and testing have all led to a very different environment in which testing takes place in our own times.

Malcolm V Lowe

Below: This image, centred on Avro York G-AGOA, provides an illustration of the plethora of British aircraft types available to view at Radlett in 1947. It also illustrates something of the sheer vitality of early post-war British aircraft designers and manufacturers.



Chapter 1: The 1945 to 1950 period



Above: Lancasterian 'Ghost' test-bed VM703 'R'. Following service with 231 Squadron and a period of storage at 20 MU, VM703 was delivered to De Havilland in October 1946 to be fitted with two Ghost jet engines with which it first flew on 24 June 1947. In early October 1947, this airframe had Walther rockets fitted in its belly and made its first rocket-assisted take-off on 6 October. VM703 was struck off charge (SOC) on 23 June 1950.

The enormous workload and highly successful test work that was performed by the RAE at Farnborough and by the A&AEE at Boscombe Down, in conjunction with their related units and out-stations, was an important, if often overlooked, contribution that helped significantly towards the Allied victory in 1945. Both organisations had seen a huge growth in their size and workload during the war, and many new concepts and innovations in addition to a large number of aircraft types and sub-types, had been tested and (to one extent or another) successfully put into service. The same was true in the wider sense for Britain's aircraft and component manufacturers themselves.

The wartime period for most aircraft companies had been a time of expansion and success, particularly when compared with the difficult times during the 1930s when many had struggled to survive before substantial orders had started to be placed. The coming of peace, however, brought about many swift changes. Although there were many challenges for the future – not least the myriad developments that jet engine technology promised – there was an inevitable down-sizing almost as soon as the war ended.

Nevertheless, the framework was in place at the end of the war for the creation and testing of new designs and concepts, together with the development and improvement of existing designs. Without doubt, at the end of World War Two Britain possessed one of the world's finest and most important aircraft industries, which was seemingly in good shape to meet the challenges of the post-war world. The industry was a significant

employer in terms of numbers, and several major companies, such as de Havilland and Gloster, were already forging ahead with designs that put them at the forefront of the new jet aircraft technology and manufacture. This happy situation continued to exist for a number of years, and the onset of the Cold War in the immediate post-war years gave considerable impetus to the need for future development. Indeed, these were exciting and forward-looking times for the British aircraft industry, and this was reflected by the large amount of research and development work, allied to a large amount of test flying, that took place in this and the following three decades.

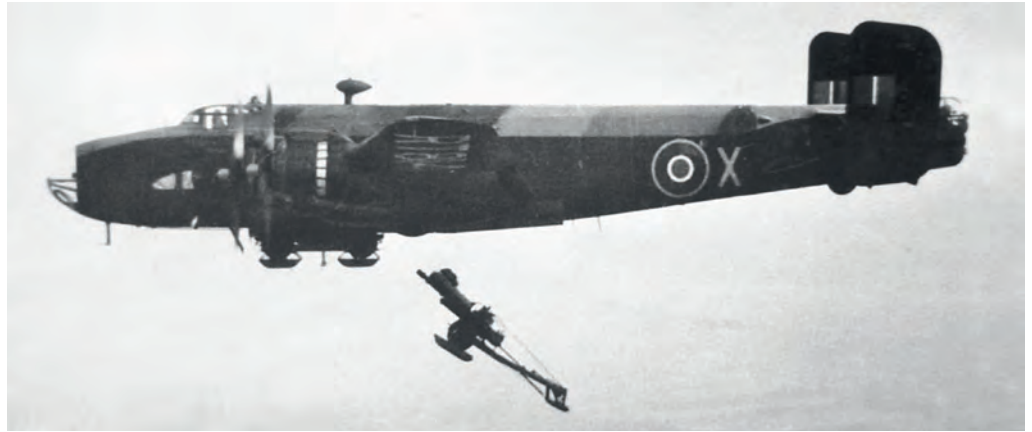
A considerable expansion in the wartime facilities was planned at RAE Farnborough. The intention was to continue the excellent standard and breadth of research and development on a wide range of aviation-related subjects such as aerodynamics, aviation electronics (now simply called avionics), structures, and weapons, that had been so significant during the war. The workforce at Farnborough had peaked at some 6,000 at the height of the establishment's activities in the war years, this figure including technical and development staff in addition to ancillary personnel. In the run-down of some activities as the peace commenced in 1945, this figure was considerably reduced. Some activities, notably the development of piston engines, were closed down altogether not long after the end of the war. However, work on jet engines considerably expanded.

The National Gas Turbine Establishment (NGTE) was set up and located at Pyestock near to the RAE's facilities at Farnborough. This amalgamated some of the development work that had previously been carried out by the relevant engine departments at Farnborough, together with the famous Power Jets Ltd which had been so instrumental in the development of Britain's early jet engines. In April 1946 the overall responsibility for RAE Farnborough was taken on by the new Ministry of Supply, which replaced the wartime Ministry of Aircraft Production. A significant development in 1948 saw Britain's behind-the-scenes research and development centre gain a more open and public face, with the staging of the annual SBAC air display and trade exhibition at the airfield for the first time.



Left: Vickers Wellington II Z8570/G (for Guard) which was used to test the very earliest of British jet engines including the Whittle W2B. Its work done, Z8570/G was SOC on 30 October 1945.

Right: Handley Page Halifax A.9, RT814 'X', belonging to the Transport Command Development Unit. RT814 and RT816 arrived with this unit in December 1946 to replace earlier Halifax airframes with RT814 being used to test drop, among other items, a combined artillery piece and jeep as seen in this 1947 photograph. The drop in this instance was from a height of 8,000ft at 170mph. Ultimately replaced by other types, RT814 later served with the RAE and was eventually SOC on 28 March 1951. (Reportedly, the last active Halifax in RAF service was A.9 RT936 which was written off following an accident on 21 April 1953.)



This was the forerunner of the major biennial international aviation trade fair that takes place at Farnborough in our own times.

The A&AEE at Boscombe Down also saw its wartime workforce run down due to the end of the war. At the peak of activities during the final months of the war, just over 2,300 military personnel were stationed at Boscombe Down, the majority of these being members of the RAF although forty-eight were Royal Navy personnel. There were over 100 civilians, these including scientists and support staff. In October 1944 there were 142 aircraft assigned to the various test units within the A&AEE. These significant numbers were reduced later in 1945, (only just over fifty aircraft were assigned by mid-1947), but the future of the site itself had been assured late in the war with the intended construction of a long runway and various extended facilities that established the precedent that Boscombe Down would eventually become Britain's chief experimental and testing airfield.

The specific organisation of departments within the A&AEE had already undergone a number of changes and reorganisations over the years. During 1944 three specific divisions were formalised within the A&AEE for the assessment and verification of performance, engineering, and armament. There were also sections for photography, navigation, radio and radar equipment. The actual flight testing was undertaken by four 'trials squadrons', these being A Squadron with specific responsibility for fighters, B Squadron with reference to four-engined aircraft, C Squadron which dealt with naval aircraft, and D Squadron which flew twin-engined and a variety of miscellaneous types. A separate Flight dealt with communications and 'special duties'. This organisational structure was carried into the post-war environment, although a number of changes were incorporated in subsequent years. One of the major changes took place in 1945, with the departure of the Empire Test Pilots School to Cranfield. The stay for the school was brief at this Bedfordshire airfield, however, and in 1947 the ETPS moved to Farnborough.

In addition to the official test work that took place within the particular terms of reference at Farnborough and Boscombe Down and their associated out-stations, much test and development work was also carried out in the wider aircraft

industry. Indeed, a tradition had built up of co-operation between some sections of the industry and the research and development facilities at RAE Farnborough, and this situation continued into the post-war era. In addition, manufacturers that specialised in particular aspects of aviation equipment also tended to perform some of their own flight-testing, often with reference to the personnel at Farnborough, prior to official flight testing at the RAE and A&AEE.

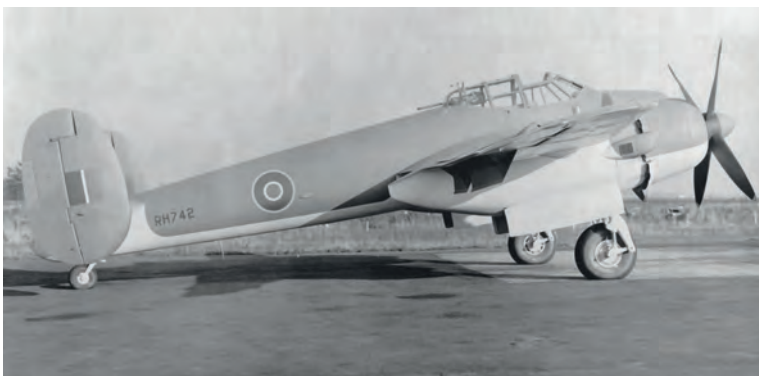
In the years immediately after World War Two, for example, a great deal of flight test work was undertaken by the industry into engine development. A variety of engine test-beds, often utilising large four-engined aircraft such as the Avro Lancaster, were important in the development of jet and turboprop engines during that period. Other companies, such as Martin-Baker with its famous line of ejection seats which were developed from 1944 onwards, also carried out some of their own flight testing. The development of ejection seats was, and still remains, an aspect of aviation technology where Britain literally leads the world. The onset of jet-powered aircraft which were faster than existing piston-engined combat aircraft necessitated the development of a safe and fast means of exiting an aircraft that was in difficulties.

This growing necessity was illustrated by the tragic death of an RAE test pilot in 1944 while flying an early Gloster Meteor. Martin-Baker subsequently started development work that led on to its successful and very widely-used series of ejection seats. Initial flight trials of an early dummy installation were performed by Martin-Baker in May 1945 using a specially-modified Boulton-Paul Defiant that had been loaned to the company through the MAP. The first live firing of a real human was made by one of Martin-Baker's employees who was successfully fired from a Gloster Meteor in July 1946. In subsequent years Martin-Baker continued to use Meteors for test work, flying from the company's immaculate Chalgrove airfield.

Without doubt the performance capabilities of combat aircraft moved ahead in leaps and bounds during the World War Two period, particularly with the development of the jet engine as a viable source of propulsion. By the end of the war the possibility of supersonic flight was starting to dawn. It was a barrier that some fast-flying propeller-driven and early jet aircraft had neared on a number of very dangerous occasions during and after the war, but the advances in aerodynamics and jet

Continued on page 8

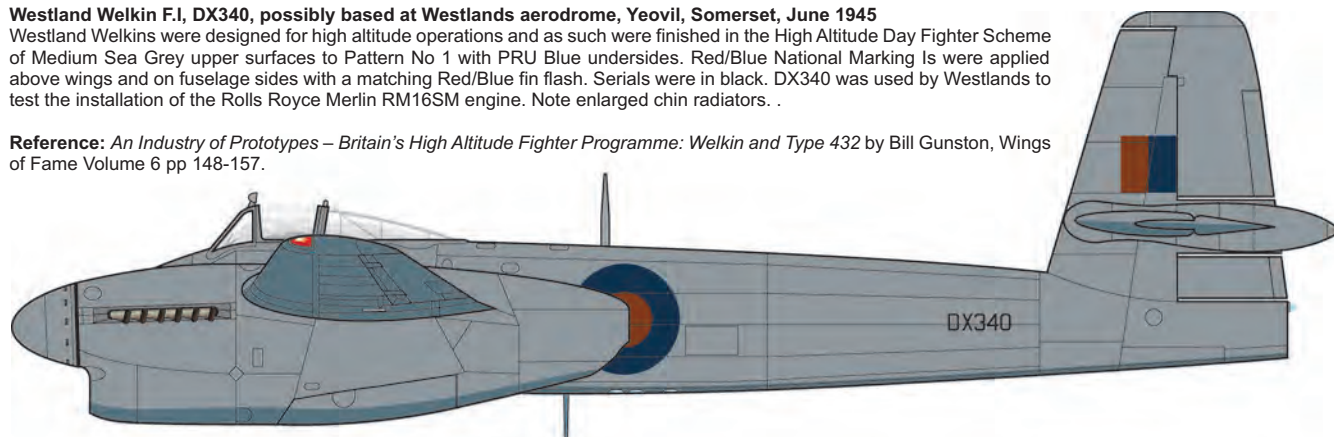
Left: Bristol Brigand TF.1 (Torpedo Fighter 1) RH742 seen on 9 July 1949 with its original heavily-framed cockpit complete with .5in mg. Readers familiar with the Beaufighter TF.10 will no doubt recognise the Brigand as an obvious replacement for its famous forebear. However, in 1946, the need for torpedo-armed aircraft quickly vanished once the Air Staff considered coastal strike aircraft to be obsolescent as post-war defence strategies were re-evaluated. Consequently, the only Brigands completed as TF.1s were RH742 to RH755, although the latter was converted to B.1 standard as indeed were the remainder of the initial order covering 80 airframes. None of the true TF.1s entered operational service, but most served with various establishments including the Air Torpedo Development Unit at some point. RH742 served with the latter as well as at the A&AEE and Empire Central Flying School; it was SOC on 17 June 1954.



Westland Welkin F.I, DX340, possibly based at Westlands aerodrome, Yeovil, Somerset, June 1945

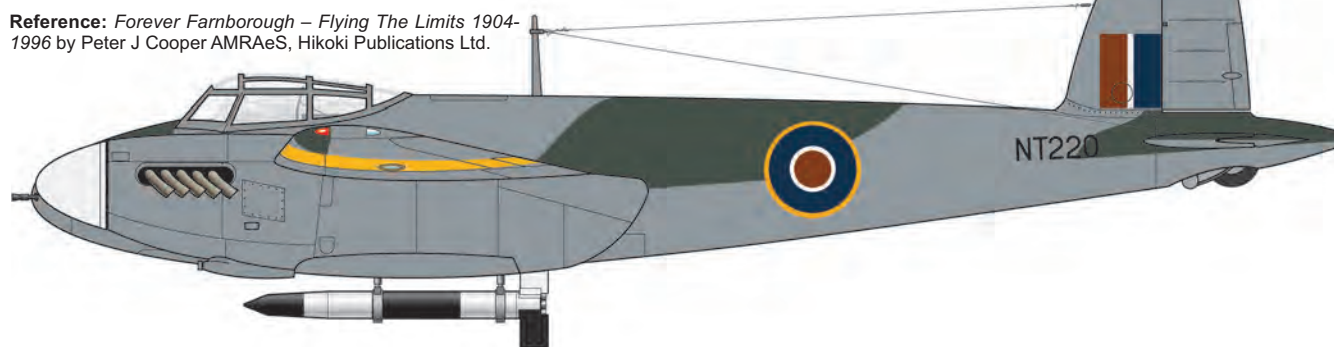
Westland Welkins were designed for high altitude operations and as such were finished in the High Altitude Day Fighter Scheme of Medium Sea Grey upper surfaces to Pattern No 1 with PRU Blue undersides. Red/Blue National Marking Is were applied above wings and on fuselage sides with a matching Red/Blue fin flash. Serials were in black. DX340 was used by Westlands to test the installation of the Rolls Royce Merlin RM16SM engine. Note enlarged chin radiators. .

Reference: *An Industry of Prototypes – Britain's High Altitude Fighter Programme: Welkin and Type 432* by Bill Gunston, Wings of Fame Volume 6 pp 148-157.

**De Havilland Mosquito FB.VI, NT220, RAE Farnborough, Hampshire, May 1945**

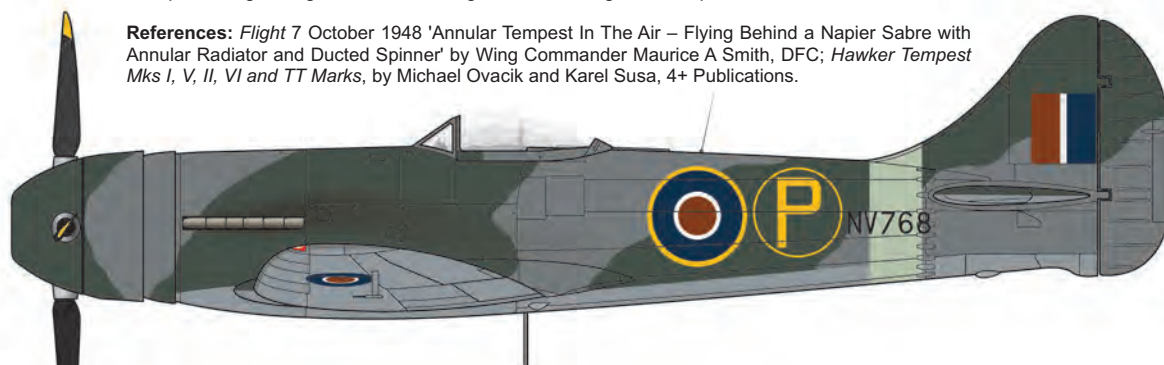
Finished in the standard wartime Intruder Scheme of overall Medium Sea Grey with a disruptive pattern of Dark Green on the upper surfaces to Pattern No 1, with wartime National Markings and black serial number, NT220's spinners were white and Yellow bands were carried around the wings. The aircraft is illustrated as it looked during tests of the 'Uncle Tom' air-to-surface rocket installation. Two of these weapons were mounted side by side on the aircraft's centreline, although the installation was ultimately envisaged to be used by flying boats, notably the Short Sunderland, against U-Boats. NT220 was eventually broken up as scrap.

Reference: *Forever Farnborough – Flying The Limits 1904-1996* by Peter J Cooper AMRAeS, Hikoki Publications Ltd.

**Hawker Tempest Mk V, NV768, flown by Chief Test Pilot Jack Oliver, Napier & Son, mid-1940s**

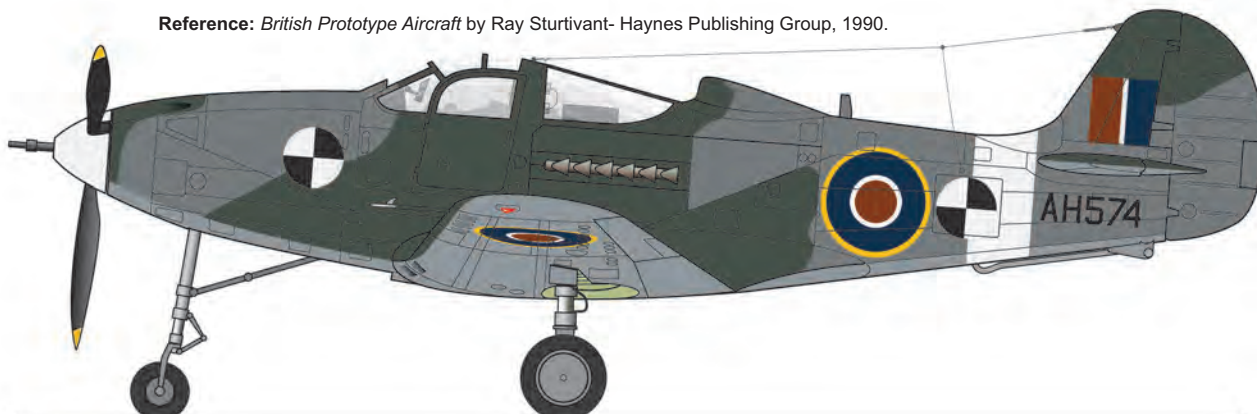
NV768 was finished in the standard wartime RAF Day Fighter Scheme of Dark Green and Ocean Grey with Medium Sea Grey undersides with wartime roundels/fin flash, black serial number and Yellow 'P' marking. The so called 'Annular Tempest' was used by Napier's to test their design of an annular radiator fed through a ducted spinner to improve cooling to the Napier Sabre engine. Initially, Tempest Mk.V, EJ518 was converted to this configuration in 1944, but the aircraft crashed shortly afterwards. In October of the same year, NV768 was converted to the same standards as the previous aircraft. Although both designs proved successful and yielded much valuable information, the piston-engined fighter was in its twilight, and the design was not proceeded with.

References: *Flight 7 October 1948 'Annular Tempest In The Air – Flying Behind a Napier Sabre with Annular Radiator and Ducted Spinner'* by Wing Commander Maurice A Smith, DFC; *Hawker Tempest Mk's I, V, II, VI and TT Marks*, by Michael Ovacik and Karel Susa, 4+ Publications.

**Bell Airacobra Mk I, AH574, flown by Lt Commander Eric 'Winkle' Brown, HMS Pretoria Castle, April 1945**

AH574 was also finished in the standard wartime RAF Day Fighter Scheme with wartime roundels/fin flash, and black serial number. The aircraft featured a white spinner and rear fuselage band and had black and white photo calibration markings on the forward and rear fuselage sides. AH574 was instrumental in the early days of Royal Navy trials in to the 'rubber decks' then envisaged for aircraft carriers, and was chosen simply because it was the only aircraft available at the time with a nosewheel. Lt Cdr Brown made the first landing of a tricycle undercarriage aircraft aboard the carrier HMS Pretoria Castle on 4 April 1945.

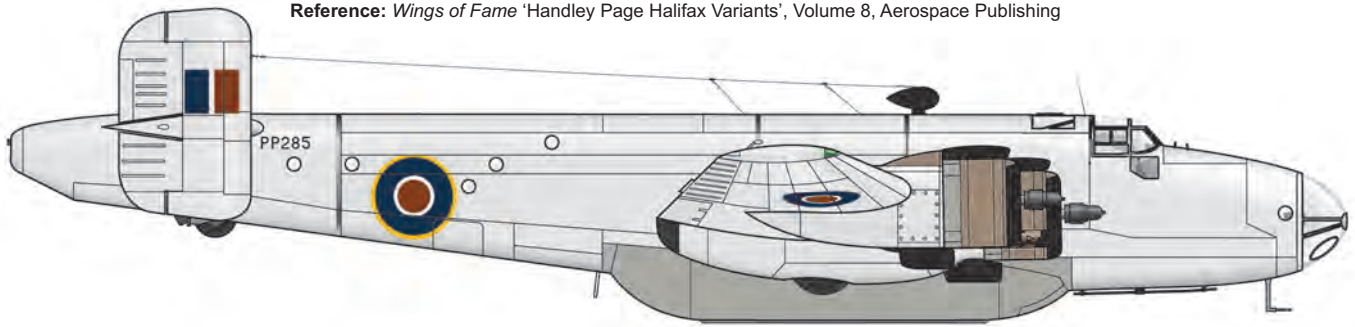
Reference: *British Prototype Aircraft* by Ray Sturtivant- Haynes Publishing Group, 1990.



Handley Page Halifax C.VIII, PP285, Handley Page Aircraft Ltd, 1945

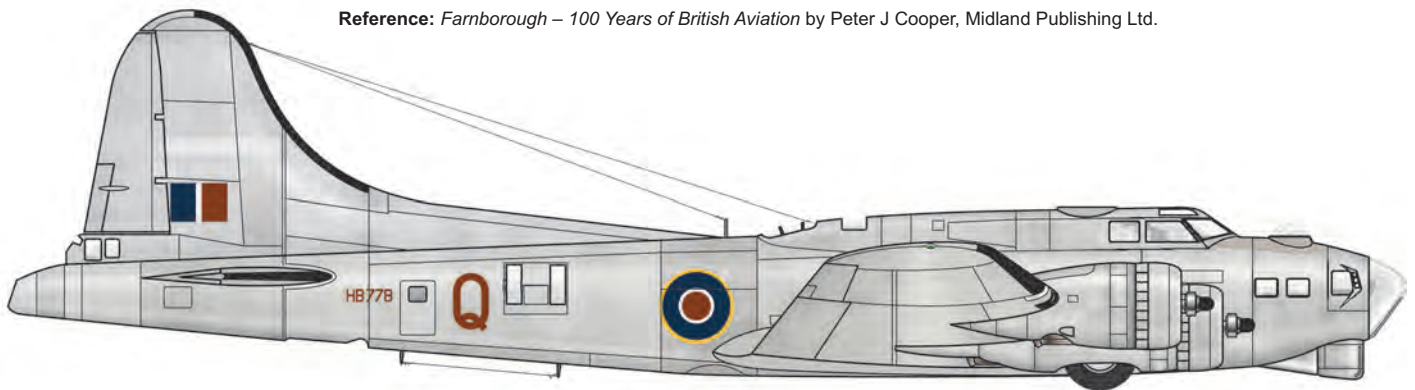
Finished in an overall highly polished natural metal scheme, something of a rarity on the Halifax, with what appear to be heat tarnished engine cowlings, it carried wartime RAF roundels and fin flashes, which were also applied on the inside faces of the fins, PP285 undertook various trials duties with Handley Page from 1945. The large fairing mounted in the bomb bay was a freight container and appears to have been finished in a medium grey (undercoat?). In all ninety-eight C.VIIIs were built by Handley Page, some later serving with BOAC.

Reference: *Wings of Fame 'Handley Page Halifax Variants'*, Volume 8, Aerospace Publishing

**Boeing B-17G Fortress Mk III, HB778/Q, Structures & Mechanical Engineering Flight, Royal Aircraft Establishment, Farnborough, September 1946**

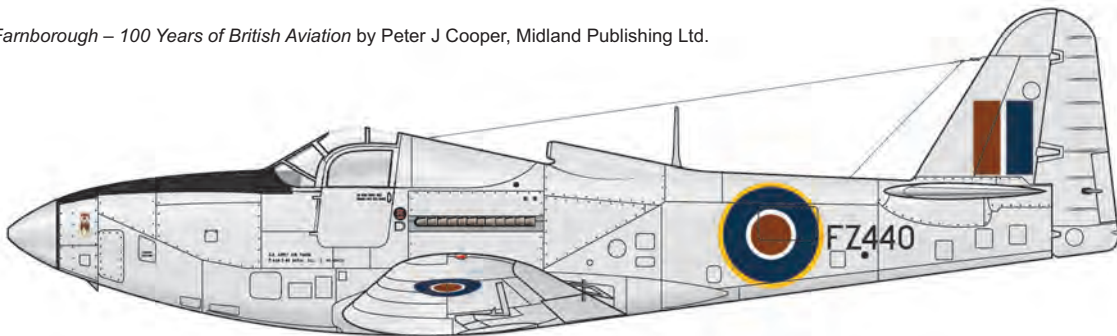
HB778 was also in an overall natural metal finish with wartime RAF National Markings. The serials and individual aircraft code letter 'Q' were in red. This aircraft came onto RAE Farnborough's strength from USAAF stocks in March 1945, and was used for a variety of trials, initially with the Wireless Flight, before moving onto S&ME Flight. By this time, the aircraft was starting to look decidedly 'worn', and was sent back to the USAAF's 3rd Air Force in September 1952.

Reference: *Farnborough – 100 Years of British Aviation* by Peter J Cooper, Midland Publishing Ltd.

**Bell P-63A-9-BE Kingcobra, FZ440 (42-69423), Aerodynamics Flight, Royal Aircraft Establishment, Farnborough, 1946**

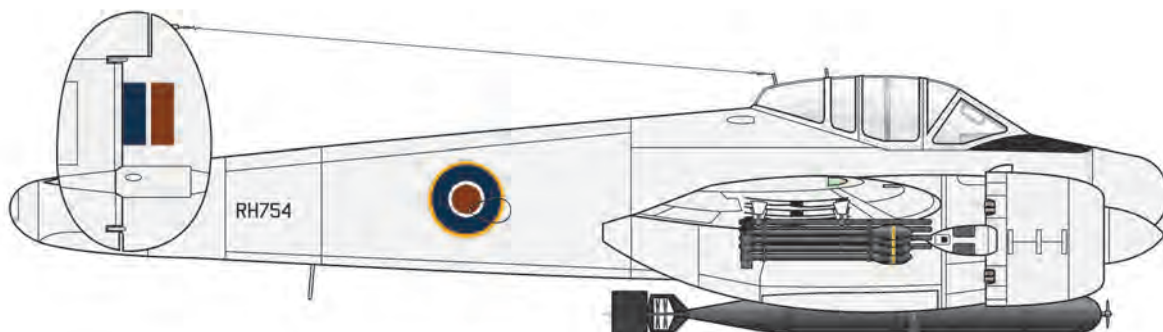
Two P-63A Kingcobras were used by the RAE, and were allocated the British MAP serials FR408 and FZ440. FR408 was finished in the standard US Olive Drab/Neutral Gray scheme, whereas FZ440, illustrated here, was in the overall natural metal finish, with Olive Drab anti-glare panel, wartime roundels/fin flashes and black serials. Both aircraft were used for high speed laminar flow research. The procedure consisted of coating the inner wing section with a chlorine-reactive chemical, the aircraft was then flown through a chlorine vapour trail dispersed by a second aircraft (initially, this was dispensed from a chimney!) FZ440 was struck off charge, then sold as scrap in 1949.

Reference: *Farnborough – 100 Years of British Aviation* by Peter J Cooper, Midland Publishing Ltd.

**Bristol Brigand TF.1, RH754, A&AEE Boscombe Down, June 1947**

Finished in an overall white scheme with wartime roundels/fin flashes, black serials and anti-glare panel, RH754 was used by the A&AEE to test various external weapons installations such as the RP VIII Type 6 rocket projectile as shown here coupled with the Mk IVC gunsight. It is also illustrated carrying a torpedo mounted on the fuselage centreline. RH754 ended its days on the Shoeburyness ranges as a gunnery target.

Reference: *Cold War Years- Flight Testing at Boscombe Down 1945-1975* by Tim Mason, Hikoki Publications Ltd; *Aeromilitaria No 1*, 1979 'Brigands', Air Britain.



Continued from page 5

propulsion made supersonic flight a significant goal, towards which a number of countries, including Britain, started to work towards.

Eventually Specification E.24/43 was issued (this being one of a comparatively new but increasingly significant selection of 'E'-suffix experimental classification official Specifications) to cover the development of what would be the world's first manned supersonic aircraft, able to fly at some 1,000mph (1,609km/h) at 36,000ft (10,973m) – the Miles M.52.

The small but innovative Miles company was tasked with the development of a research aircraft to this requirement, and it created the M.52 design. With a configuration that partly drew from some aspects of ballistics, the M.52 was a straight wing, streamlined, projectile-like design, with its pilot positioned in the nosecone within a jettisonable container. Powered by an advanced turbojet with the then new concept of an afterburner

planned for the future, unfortunately, after much design work had been performed, the whole project was cancelled by the British government in February 1946. An air-dropped model of the M.52 was successfully launched several years after the M.52's cancellation and much of the M.52's ground-breaking technology was instead passed to the Americans, who used some of the advanced British ideas – such as the all-flying tailplane – on the Bell X-1, which became the first aircraft to 'officially' break the sound barrier in October 1947. This was a crippling blow to Britain's aircraft industry, and it ensured that in the post-war period the Americans would eventually take an unassailable lead in jet fighter design.

The M.52 was, in fact, one of a number of 'own-goals' in the post-war period, many caused by less than wise politicians, that led to an inevitable eventual decline in Britain's pre-eminent position in the aviation world – a reality that was to have very far-reaching effects not only on Britain's aircraft companies, but on the military and on the test establishments as well.

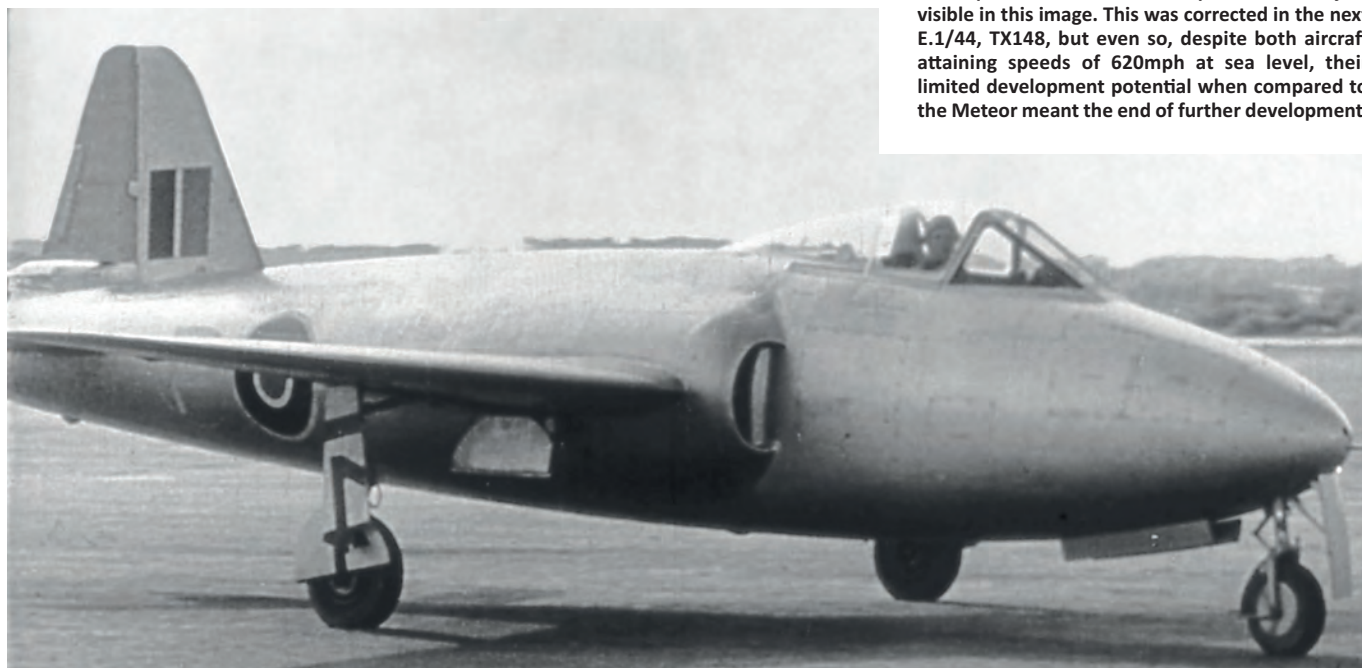


Left: Saunders-Roe SR.A1, TG263 – a twin-jet experimental flying-boat fighter – was the result of a concept brought about by the lack of permanent airfields across vast swathes of the Pacific Ocean while the war against Japan continued. Despite the war's conclusion the concept was pursued and the Saunders-Roe company produced their prototype SR.A1 jet fighters, the first of which, TG263, flew in July 1947 powered by two Metrovick Beryl jet engines. Two further 'boats' were also built, TG267 and TG271, and it was the latter which recorded a maximum speed of 516mph at 20,000ft using slightly more powerful Beryl engines of 3,850lb thrust each (as opposed to 3,500lb). Armament would have included 20mm Hispano cannon for which gun ports were provided in the nose although, reportedly, the guns themselves were never shipped. In this image one of the cannon ports is just visible above TG263's lowered wing float; once sufficient speed had been achieved the floats were retracted (inwards) into the wing to reduce drag. Needless to say, the jet flying-boat fighter concept remained purely experimental.



Left: Vickers Wellington T.10, LN715, which was used to develop the Rolls-Royce Dart engine in connection with Vickers Viscount trials. LN715 was SOC on 5 April 1951.

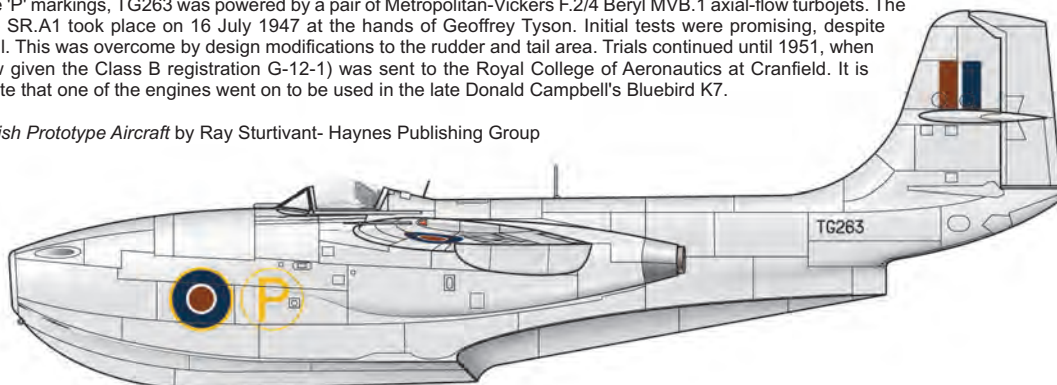
Below: Seen in March 1948, Gloster E.1/44, TX145, was the result of a 1942 proposal by Glosters for a jet fighter design. TX145 made its first flight in March 1948 and although its acceleration and rate of climb were deemed favourable its general handling characteristics were less so – a consequence of its low-set tailplane which is just visible in this image. This was corrected in the next E.1/44, TX148, but even so, despite both aircraft attaining speeds of 620mph at sea level, their limited development potential when compared to the Meteor meant the end of further development.



Saunders-Roe SR.A1, TG263, flown by Saunders-Roe Chief Test Pilot Geoffrey Tyson, 16 July 1947

With the war against Japan looking to continue beyond 1945, the feasibility of a fighter capable of taking off from, and landing back on water, seemed very attractive to Britain, with the possibility of an island hopping campaign against the Japanese mainland. As a result, Saunders-Roe submitted their design for a twin-jet flying-boat fighter, given the designation SR.44, but officially called the SR.A1 – and unofficially dubbed 'The Squirt'. In the event, the war was over by August 1945, but the design showed much promise and development continued. Painted overall Aluminium/High Speed Silver finish, with wartime roundels/fin flashes with black serials and Yellow prototype 'P' markings, TG263 was powered by a pair of Metropolitan-Vickers F.2/4 Beryl MVB.1 axial-flow turbojets. The first flight of the SR.A1 took place on 16 July 1947 at the hands of Geoffrey Tyson. Initial tests were promising, despite encountering roll. This was overcome by design modifications to the rudder and tail area. Trials continued until 1951, when the aircraft [now given the Class B registration G-12-1] was sent to the Royal College of Aeronautics at Cranfield. It is interesting to note that one of the engines went on to be used in the late Donald Campbell's Bluebird K7.

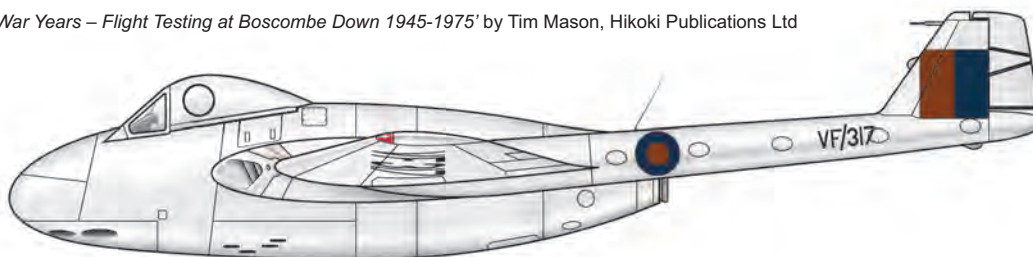
Reference: *British Prototype Aircraft* by Ray Sturtivant- Haynes Publishing Group



De Havilland Vampire F.3, VF317, A&AEE Boscombe Down, November 1947

Painted overall Aluminium/High Speed Silver finish with Red/Blue National markings and black serials, VF317 was added to the number of Vampires already on the strength of the A&AEE, and was used mainly for radio, IFF (Identification Friend or Foe) tests, arriving at Boscombe Down in November 1947. Note the presentation of the serial number with a slash between the letters and the numbers – a peculiarity seen on aircraft within this serial batch. Also of note is the non-standard cockpit canopy hood, possibly fitted for jettison test work. VF317's life at Boscombe Down was short though, leaving the establishment in February 1948.

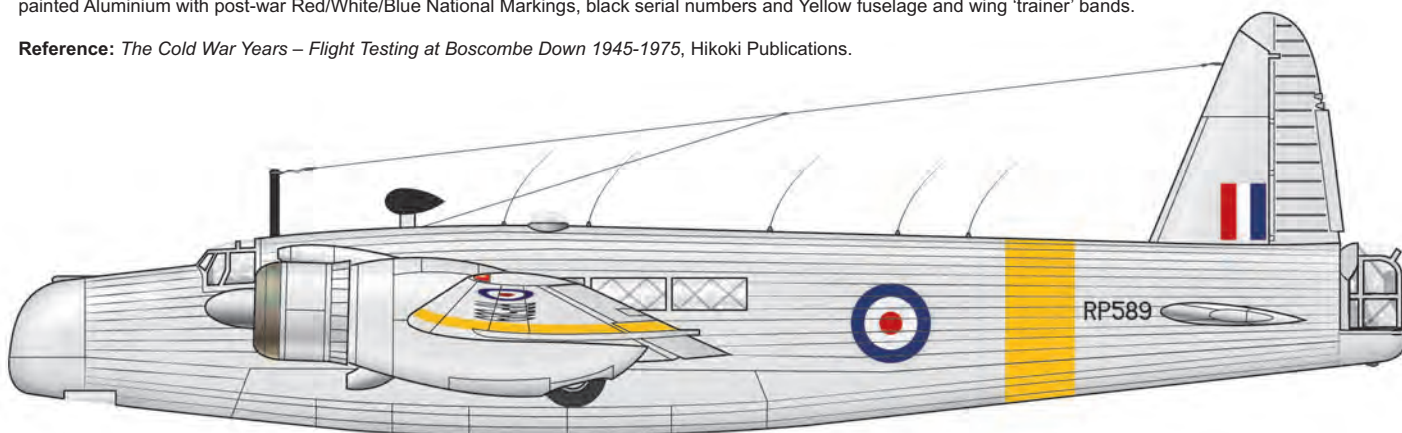
Reference: *Cold War Years – Flight Testing at Boscombe Down 1945-1975* by Tim Mason, Hikoki Publications Ltd



Vickers Wellington T.10, RP589, A&AEE Boscombe Down, 1948

One of the last Wellingtons in British use, RP589 was still on the strength of the A&AEE at Boscombe Down during 1948, as a navigation trainer. However, the aircraft was found to be wholly unsuitable for this role due to lack of internal space, poor field of view and the type's unsuitability as an astro-navigation trainer. Finish was overall painted Aluminium with post-war Red/White/Blue National Markings, black serial numbers and Yellow fuselage and wing 'trainer' bands.

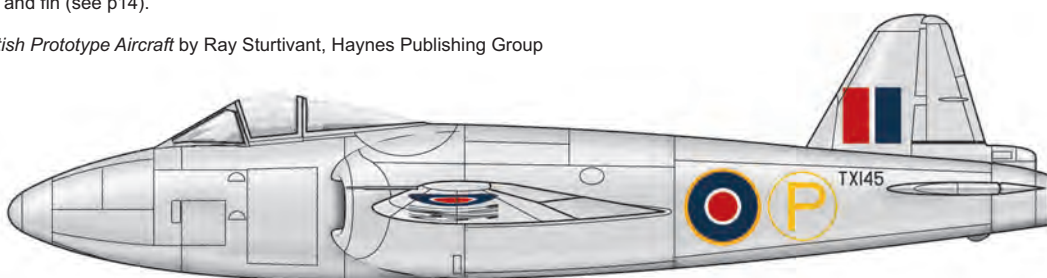
Reference: *The Cold War Years – Flight Testing at Boscombe Down 1945-1975*, Hikoki Publications.



Gloster E.1/44, TX145, Gloster Aircraft Ltd, March 1948

In January 1942, Glosters put forward a proposal to the Ministry of Aircraft Production for a fighter design, gleaming experience learned from their famous E.28/39. A specification was drawn up and work commenced on development. However, it wasn't until July 1947 that SM809, the first flyable prototype, was ready for test. Unfortunately, during the aircraft's journey by road to Boscombe Down, the transporting vehicle was involved in an accident, the result of which SM809 was written off. Production had already begun on TX145, and this was accelerated to get the aircraft into the air as soon as was possible. Painted overall Aluminium/High Speed Silver finish with wartime National Markings, black serial number and Yellow prototype 'P' on the rear fuselage, TX145 made her first flight on 8 March 1948 with Chief Test Pilot Bill Waterton at the controls. Rate of climb and acceleration were favourable, but general handling left much to be desired and a number of modifications were made to the tail and fin (see p14).

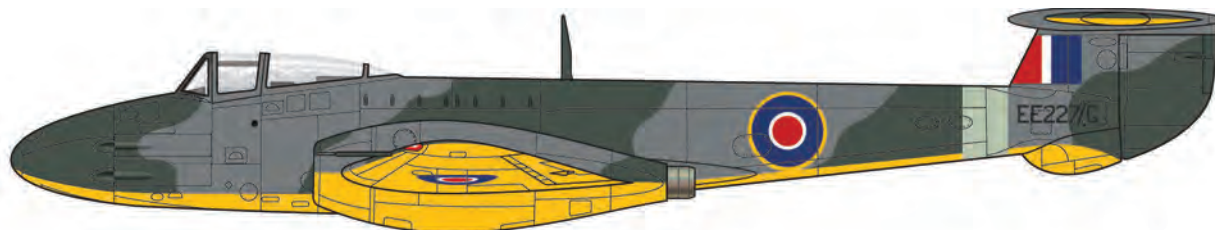
Reference: *British Prototype Aircraft* by Ray Sturtivant, Haynes Publishing Group



Gloster Meteor F.1, EE227/G, Royal Aircraft Establishment, Farnborough, January 1945

EE227/G was originally with 616 Squadron at Manston from 26 September 1944, coded YQ•Y, but when the unit began to replace its F.1s with F.3s, it was passed onto Farnborough in December 1944. Finished in Ocean Grey and Dark Green upper surfaces with Yellow undersides it had black serials and carried the Fighter Command Sky fuselage band. Fuselage roundels are the wartime style 36 inch diameter National marking IIIs with narrow Yellow surrounds, while those on the wings are the Red/White/Blue, 54 inch diameter National marking IAs (above) and 32 inch diameter National marking IIs (underneath). Of note is that the upper portion of the fin was removed for directional stability trials. It was replaced in February 1945 and the aircraft was sent to Rolls-Royce in March same year and fitted with Rolls-Royce RB.50 Trent turboprops.

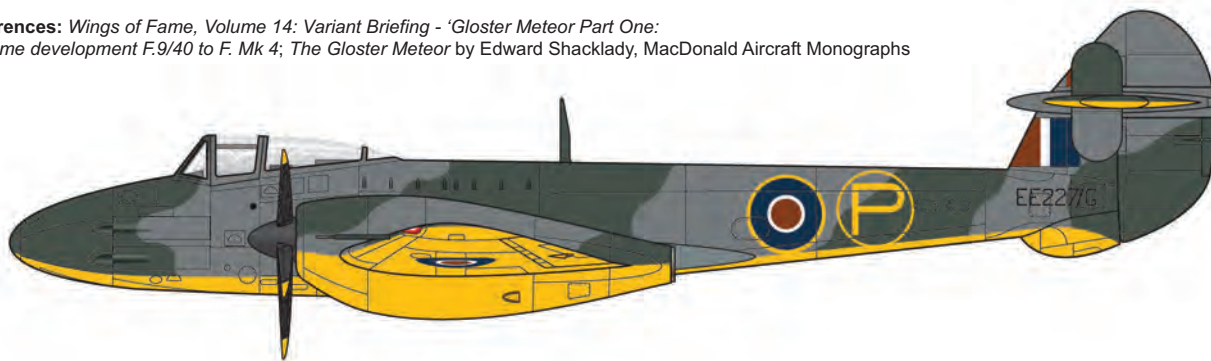
Reference: *The Gloster Meteor* by Edward Shacklady, MacDonald Aircraft Monographs

**Gloster Meteor F.1, EE227/G, Rolls-Royce Ltd, Church Broughton, September 1945**

The same aircraft as that illustrated above, with the fin reinstated and a Prototype 'P' added on the fuselage sides. In March 1945 the aircraft was fitted with two Rolls-Royce RB.50 Trent turboprops, actually modified Derwent turbojets. It was also fitted with lengthened undercarriage legs to clear the propeller arcs. EE227 made its first flight under Trent turboprop power from Church Broughton on 20 September 1945. The pilot was Gloster chief test pilot, Eric Greenwood. Maximum level speed attained was 470mph. It initially flew without endplates fitted to the tailplanes, but directional stability problems led to these being fitted. Flight problems continued and aircraft was subsequently fitted with propellers of reduced diameter (4ft 10 1/2 in). EE227 went to the A&AEE at Boscombe Down for simulated deck landing trials on 18 April 1948. It was converted back to standard F.1 form in May 1948 and ended up at Farnborough, used for fire destruction tests, until being scrapped at end of 1948.

References: *Wings of Fame, Volume 14: Variant Briefing - 'Gloster Meteor Part One:*

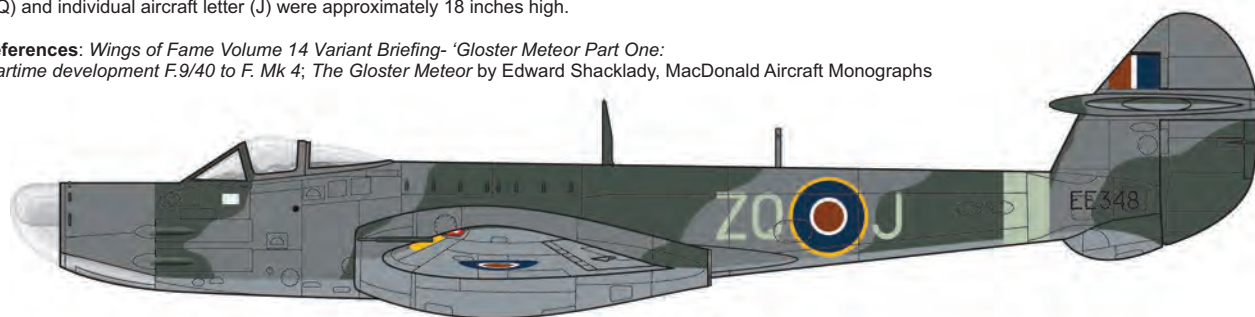
Wartime development F.9/40 to F. Mk 4; The Gloster Meteor by Edward Shacklady, MacDonald Aircraft Monographs

**Gloster Meteor F.3, EE348, ZQ•J, Central Fighter Establishment, August 1946**

This aircraft was fitted with AI radar (as used on NF.11) by the Central Radar Establishment and tested by the Central Fighter Establishment (CFE). It was finished in the standard wartime RAF Day Fighter Scheme of Dark Green and Ocean Grey with Medium Sea Grey undersides and 18 inch wide Sky rear fuselage band. Wartime National markings were carried, those above the wings being the 54 inch diameter Red/White/Blue National marking IAs, with 32 inch diameter National marking IIs under the wings and National marking IIIs on fuselage sides. The black serial number was positioned in the usual place on the rear fuselage and the CFE's Sky codes (ZQ) and individual aircraft letter (J) were approximately 18 inches high.

References: *Wings of Fame Volume 14 Variant Briefing- 'Gloster Meteor Part One:*

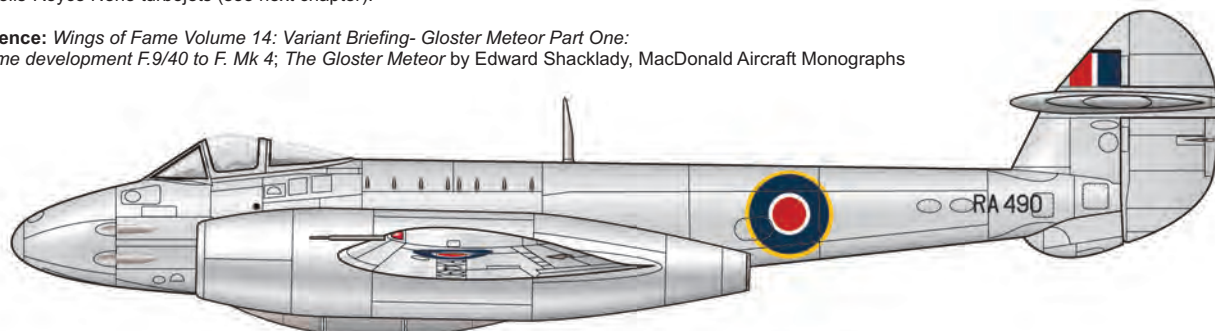
Wartime development F.9/40 to F. Mk 4; The Gloster Meteor by Edward Shacklady, MacDonald Aircraft Monographs

**Gloster Meteor F.4, RA490, Gloster Aircraft Ltd, September 1947**

RA490 was painted overall Aluminium/High Speed Silver finish with wartime National markings (IAs above, and IIs below, the wings and IIIs on fuselage sides, with matching fin flashes) and black serials. This aircraft was fitted with two Metropolitan-Vickers (MetroVick) F.2/4 Beryl axial-flow turbojets, delivering 3,850lb static thrust. These were the same type as used on Saunders-Roe SR.A1 flying boat fighter (see p9). RA490 only flew with these engines twice. On the second flight it suffered hydraulic failure forcing Gloster test pilot William 'Bill' Waterton to make a wheels-up landing. The aircraft was severely damaged, but was repaired and refitted with two Rolls-Royce Nene turbojets (see next chapter).

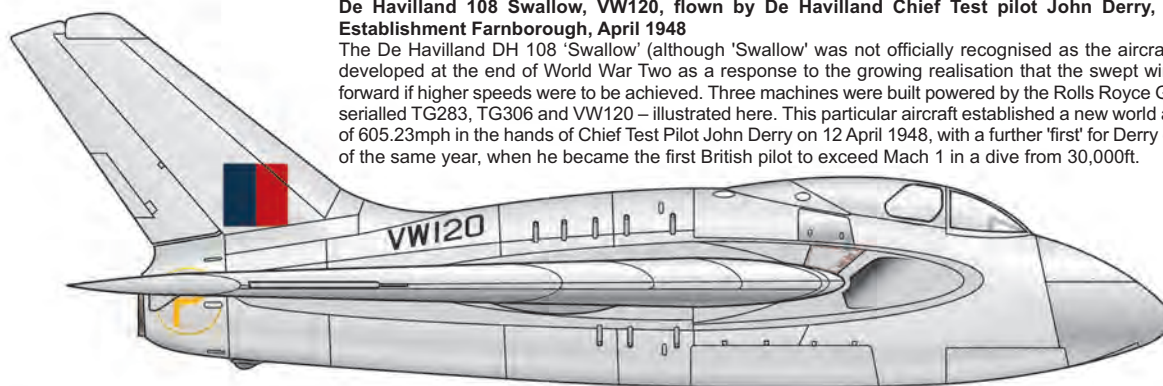
Reference: *Wings of Fame Volume 14: Variant Briefing- Gloster Meteor Part One:*

Wartime development F.9/40 to F. Mk 4; The Gloster Meteor by Edward Shacklady, MacDonald Aircraft Monographs

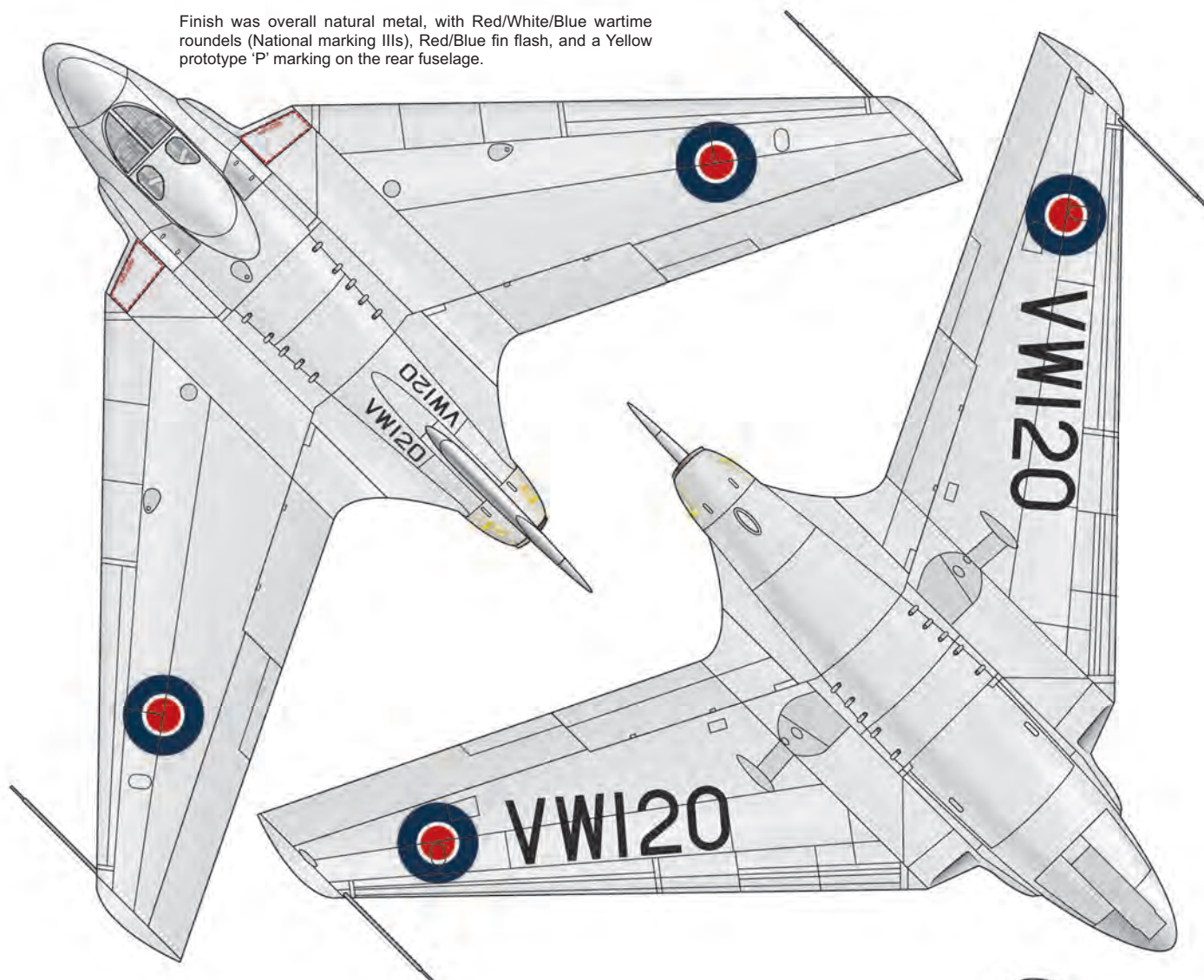


De Havilland 108 Swallow, VW120, flown by De Havilland Chief Test pilot John Derry, Royal Aircraft Establishment Farnborough, April 1948

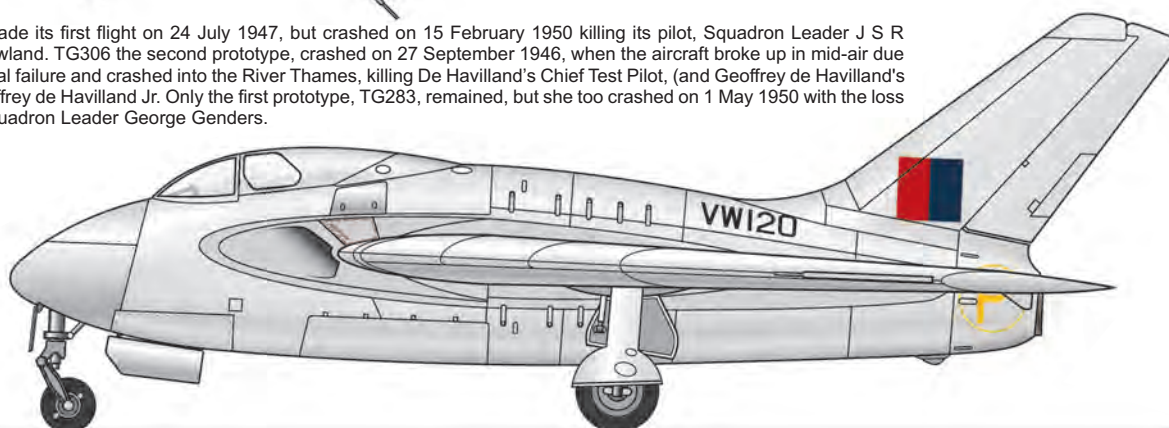
The De Havilland DH 108 'Swallow' (although 'Swallow' was not officially recognised as the aircraft's name), was developed at the end of World War Two as a response to the growing realisation that the swept wing was the way forward if higher speeds were to be achieved. Three machines were built powered by the Rolls Royce Goblin 2 turbojet, serialised TG283, TG306 and VW120 – illustrated here. This particular aircraft established a new world air speed record of 605.23mph in the hands of Chief Test Pilot John Derry on 12 April 1948, with a further 'first' for Derry on 9 September of the same year, when he became the first British pilot to exceed Mach 1 in a dive from 30,000ft.



Finish was overall natural metal, with Red/White/Blue wartime roundels (National marking IIIIs), Red/Blue fin flash, and a Yellow prototype 'P' marking on the rear fuselage.



VW120 made its first flight on 24 July 1947, but crashed on 15 February 1950 killing its pilot, Squadron Leader J S R Muller-Rowland. TG306 the second prototype, crashed on 27 September 1946, when the aircraft broke up in mid-air due to structural failure and crashed into the River Thames, killing De Havilland's Chief Test Pilot, (and Geoffrey de Havilland's son), Geoffrey de Havilland Jr. Only the first prototype, TG283, remained, but she too crashed on 1 May 1950 with the loss of pilot Squadron Leader George Genders.





Above: Handley Page Hastings C.1 prototype TE580 reveals its temporary anhedral tailplane during a series of experiments intended to cure longitudinal instability issues. Tested with a dihedral tailplane too, both configurations ultimately proved unsuccessful and TE580 was restored to its original form. However, C.1 TG502 was used to trial a new horizontal tailplane fitted 16ins lower on the fuselage which did help to improve the instability issues. The modification was applied to later Marks of Hastings but was never applied retrospectively to the C.1s, but TG502 did retain the mod and thus became something of a hybrid.



Left: Of the 300 Lancaster B.IIs built, LL735 was amongst the very last of its Mark to continue flying, that it did so was because it was used to help develop the Metropolitan-Vickers (Metrovick) F.2/4 Beryl jet engine seen extending from the rear fuselage with its distinctive intake above.

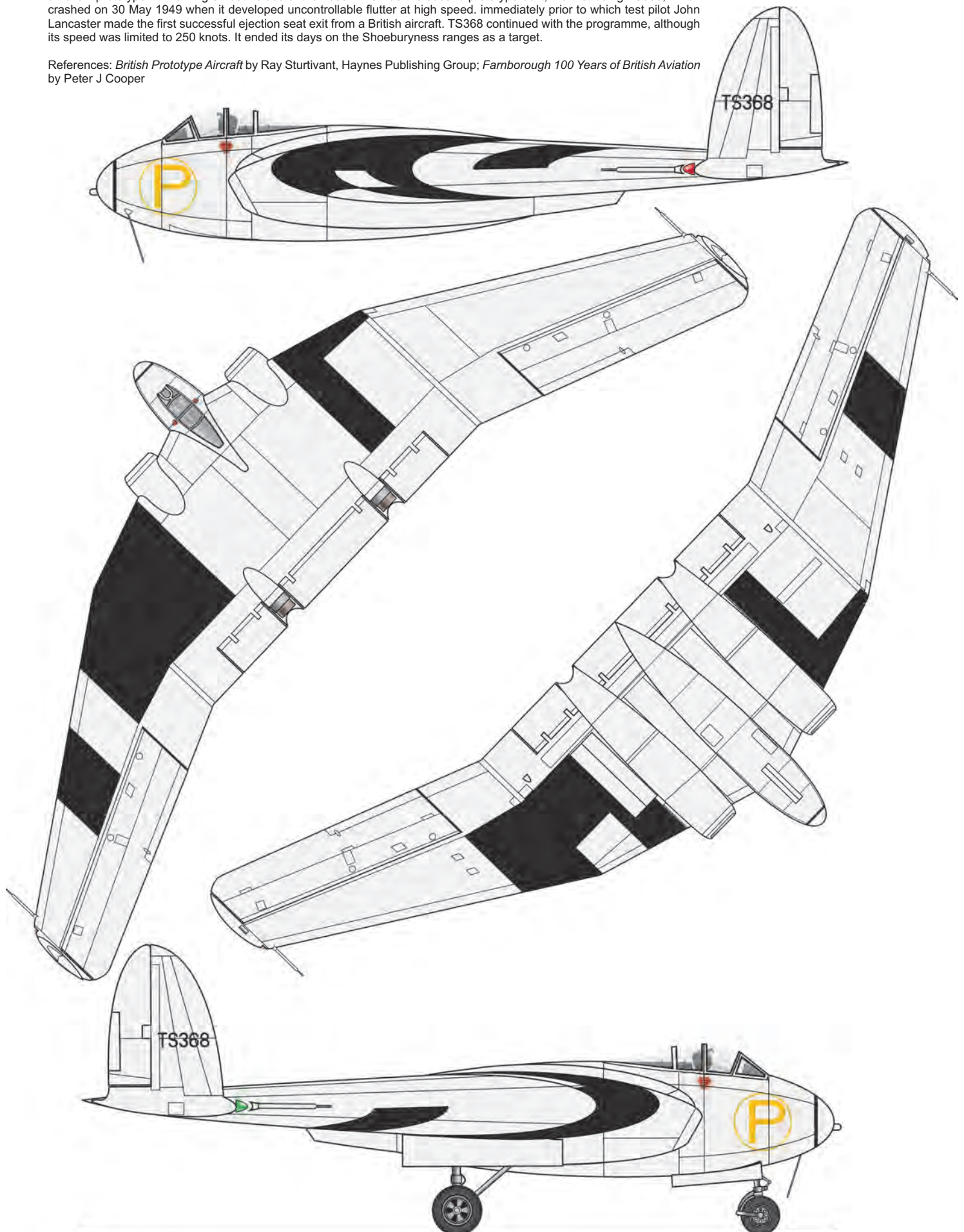
Below: First flown on 23 March 1944, LL735 was delivered to the RAE five days later and subsequently fitted with the F.2/4 jet engine. In 1949 a more powerful Metrovick F.2/4 replaced the earlier one, albeit this time mounted in the bomb bay – thus dating these two images to the period 1946 to 1948. LL735 was withdrawn on 31 March 1950 and scrapped.



Armstrong Whitworth AW.52, TS368, Royal Aircraft Establishment, September 1948

TS368 first flew on 1 September 1948 and was placed on static display at that year's SBAC Show at Farnborough, painted in an overall white scheme with black photo-calibration panels. Black serials were carried on the outer faces of the fins and a Yellow prototype 'P' marking on both sides of the nose. This was the second prototype built, the first being TS363, which crashed on 30 May 1949 when it developed uncontrollable flutter at high speed, immediately prior to which test pilot John Lancaster made the first successful ejection seat exit from a British aircraft. TS368 continued with the programme, although its speed was limited to 250 knots. It ended its days on the Shoeburyness ranges as a target.

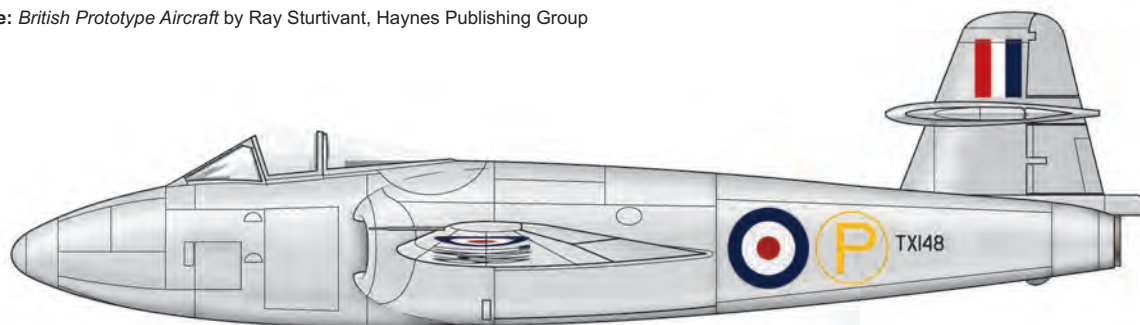
References: *British Prototype Aircraft* by Ray Sturtivant, Haynes Publishing Group; *Farnborough 100 Years of British Aviation* by Peter J Cooper



Gloster E.1/44, TX148, Gloster Aircraft Ltd, Boscombe Down, January 1949

A second E.1/44 aircraft, serialised TX148, took to the skies in early 1949, again from Boscombe Down, also finished in overall painted Aluminium/High Speed Silver finish with post-war National markings, black serial number, and Yellow prototype 'P' on the rear fuselage. Handling was much improved, and although the design didn't get into series production, the revised tailplane design adopted for TX148 was used on the Meteor F.8. TX145 (see p9) and TX148 carried on test work, with both aircraft eventually being sent to the Proof and Experimental Establishment at Shoeburyness.

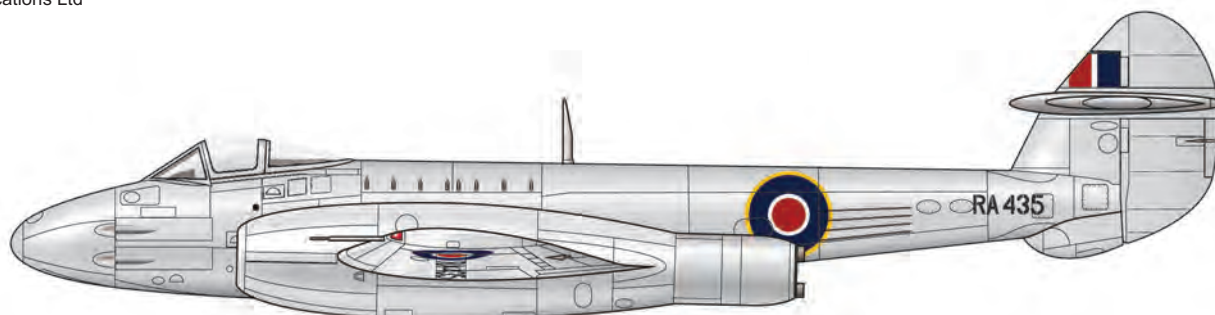
Reference: *British Prototype Aircraft* by Ray Sturtivant, Haynes Publishing Group



Gloster Meteor F.4, RA435, Rolls-Royce Ltd, April 1949

RA435 was used to test and develop the Derwent 5 engine by Rolls-Royce Ltd, from August 1947. Finished in overall painted Aluminium/High Speed Silver with wartime National markings – IAs above and IIs below the wings and National marking IIs on the fuselage sides with matching fin flashes – and black serial number on the rear fuselage. From 1 April 1949, the engines were fitted with afterburners, as illustrated. Many test flights included flying only with the starboard afterburner lit. RA435 was passed to Nos 215 and 209 AFSs (Advanced Flying Schools), then to No 2 STT (School of Technical Training) and finally to No 4 STT in June 1955.

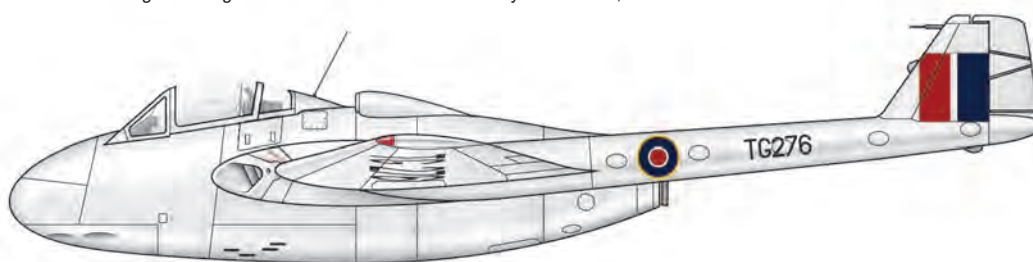
References: *The Gloster Meteor* by Edward Shacklady, MacDonald Aircraft Monographs; *Meteor – Gloster's First Jet Fighter* by Steven J Bond, Midland Counties Publications Ltd



De Havilland Vampire F.2, TG276, A&AEE, Boscombe Down, May 1949

Three Vampires, TG276 (illustrated), TG280 and TX807 were experimentally fitted with the Rolls-Royce Nene turbojet. Because of the engine's larger size and need for increased airflow, two external 'Elephant Ear' intakes were built into the upper fuselage. For obvious reasons, the aircraft was referred to as 'Vampire- Elephant Ears', even in official documentation of the time. Finished in overall painted Aluminium/High Speed Silver, the aircraft carried wartime roundels and fin flashes and black serials on the outer faces of the booms and under the wings.

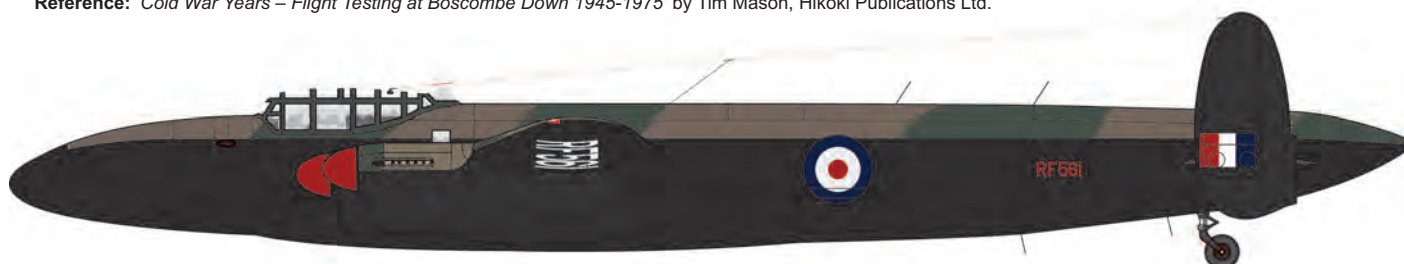
Reference: *Cold War Years – Flight Testing at Boscombe Down 1945-1975* by Tim Mason, Hikoki Publications Ltd



Avro Lincoln B.2, RF561, A&AEE Boscombe Down, 1949

Heavily modified, RF561 was used for radar tests by the A&AEE during the latter half of the 1940s, mainly on behalf of the Telecommunications Research Establishment. Finished in the standard Bomber Command scheme of Dark Green and Dark Earth to Pattern No 2, with the remaining areas in Glossy Anti-Searchlight Black, post-war Red/White/Blue National markings were carried above the wings, on the fuselage sides and all four faces of the the twin fins. The serial numbers on the rear fuselage sides were red, while those under the wings were white. Propeller spinners were red.

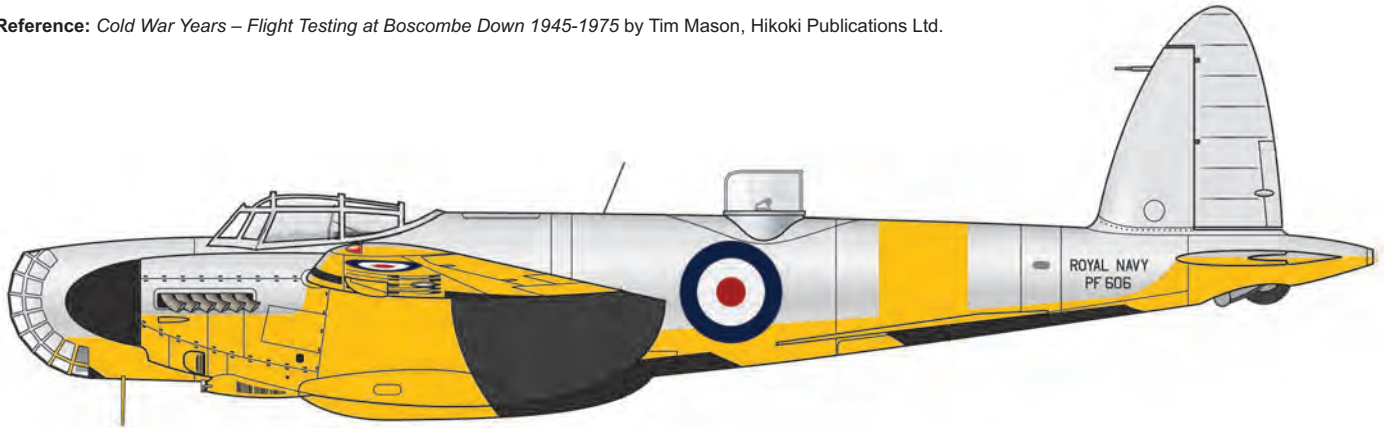
Reference: *'Cold War Years – Flight Testing at Boscombe Down 1945-1975'* by Tim Mason, Hikoki Publications Ltd.



De Havilland Mosquito TT.39, PF606, Boscombe Down, late-1940s

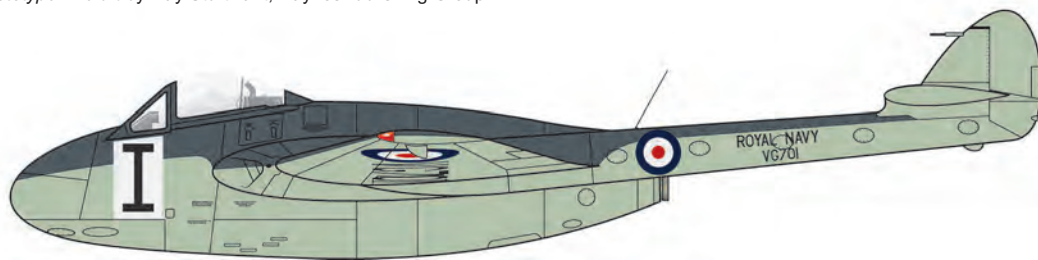
PF606 was used for general radio test and trials work at Boscombe Down. Finished in the post-war Target-Towing Aircraft scheme of painted Aluminium/High Speed Silver upper surfaces, with Yellow under surfaces with black diagonal bands, post-war Red/White/Blue roundels were carried in six positions. No fin flashes were applied. Serials and 'ROYAL NAVY' titles were in black, those under the wing were not compromised by the black diagonal bands which were truncated around the serials. A broad Yellow band was applied around the upper surfaces of the rear fuselage. Note the external IFF and VHF antennae.

Reference: *Cold War Years – Flight Testing at Boscombe Down 1945-1975* by Tim Mason, Hikoki Publications Ltd.

**De Havilland Sea Vampire F.21, VG701, used in flexible (rubber) deck trials aboard HMS Warrior, February 1949**

VG701 was one of several Vampires used in these trials from December 1947 onwards, although this particular aircraft became affiliated to the programme in July 1948. Finished in Extra Dark Sea Grey upper surfaces with Sky undersides to Pattern No 2, it carried post-war Red/White/Blue roundels in six positions with 'ROYAL NAVY' titles and serials in black on the outer faces of the rear booms. The black 'I' on a white rectangle on the nose is thought to be a photo-calibration marking. VG701 made a series of successful belly landings from 15 February 1948 despite being involved in a minor crash resulting in flap damage. The rubber deck programme continued until at least 1952, when the idea was dropped completely.

Reference: *British Prototype Aircraft* by Ray Sturtivant, Haynes Publishing Group



Above: Seen on 9 July 1949, Vampire F.1 TG285, was in the charge of Controller of Supplies (Air) or CS(A). TG285, from the first production batch of Vampire F.1s for the RAF, made its first flight in October 1945 but was almost immediately handed over to RAE Farnborough. In the event, it never served with the RAF and by the time this photo was taken TG285 was undertaking carrier barrier trials. (For RN carriers, a jet-barrier was developed consisting of two horizontal wires stretched across the deck with lengths of flexible fabric stretched vertically between them. This allowed the clean lines of a jet's nose and cockpit to part them before the strips engaged the wings etc., thereby arresting the runaway.) By 23 February 1950, TG285 was involved with unmanned barrier trials which were probably quite destructive as it was SOC in July and later scrapped.



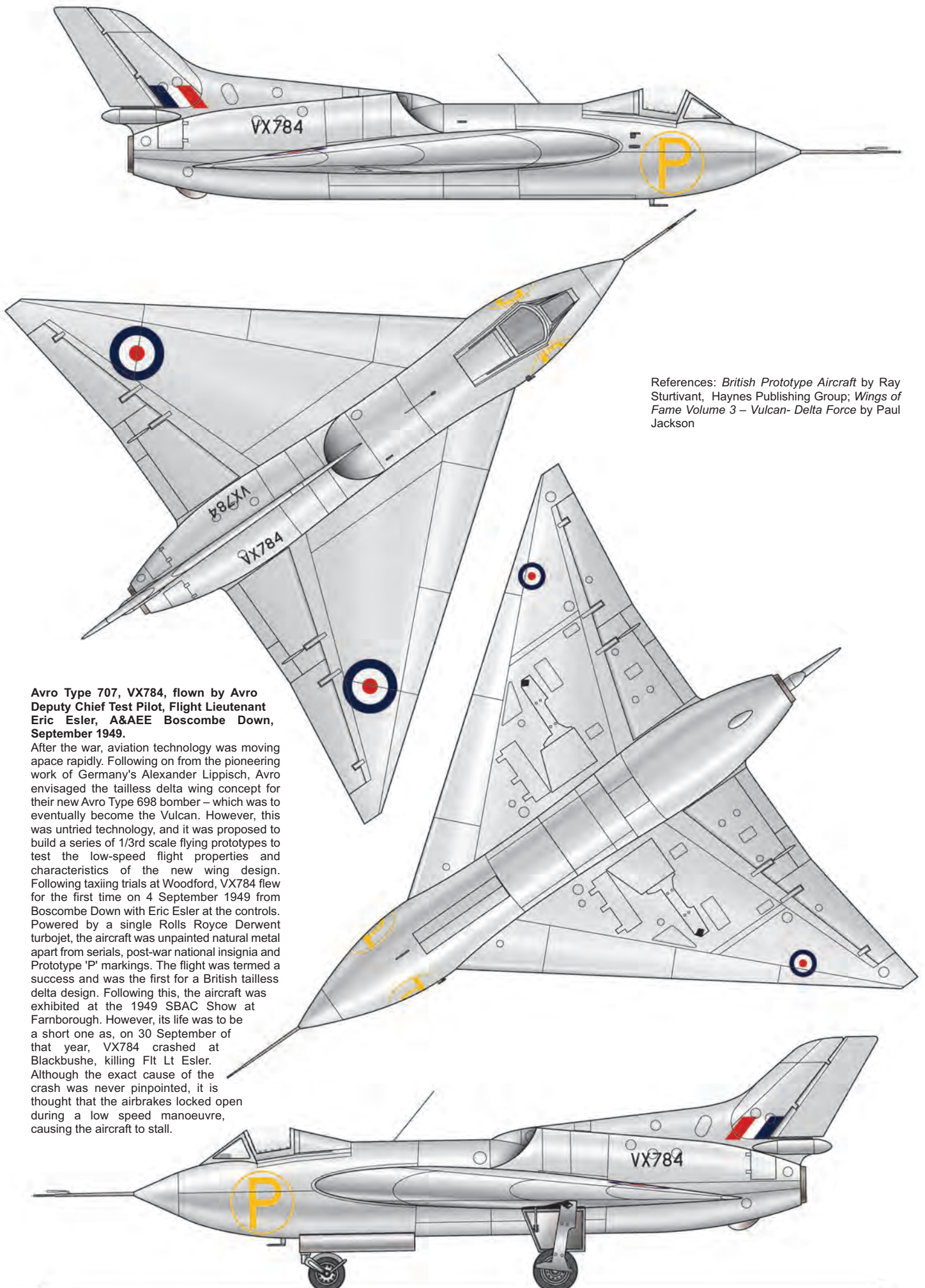
Above: This image illustrates the very first occasion on which the hose and drogue method of refuelling was used to transfer fuel, in flight, between Meteor F.3 EE397 and Lancaster G-33-2 (ex-PB972) on 24th April 1949, in which the Meteor pilot made three link-ups without apparent problems. Four months later the same pilot achieved a record endurance for a Meteor by remaining airborne for a little over 12 hours to prove that this method of in-flight refuelling was viable. The Lancaster's markings 'G-33-2' was a 'B condition' identification rather than a registration with 'G-33' being allocated to Flight Refuelling Ltd on 1 January 1948. (G-33-1 was allocated to Lancaster B.III, ND648.)



Left: With the introduction of jet-powered fighters to the RAF, particularly the Meteor, with their insatiable appetite for fuel, Flight Refuelling Ltd (FRL) continued their pioneering work in testing various methods of in-flight refuelling. Ultimately, in Britain, the probe and drogue method of refuelling became permanently established. This image is believed to have been taken at Staverton, Gloucestershire, where Lancaster B.I, PB972, had arrived in March 1945 presumably as a standard Lancaster which was later extensively modified to help explore the various methods of in-flight refuelling then being trialled.



Above: First flown on 17 March 1944, LZ551, the second DH Vampire prototype (after TG274) became the subject of much interest from the Royal Navy for whom several modifications were made to the airframe. The most obvious in this image is the presence of an arrestor hook, less obvious is the 40 per cent increase in flap area and new, long-travel, oleo legs – all necessary for the deck landing trials that commenced aboard HMS Ocean on 3 December 1945, the first occasion on which a solely jet-powered aircraft landed on a carrier at sea. Obviously missing is the nose wheel – either it had been retracted or removed entirely – while weights on each tail boom support the airframe. Was this because a lowered nose wheel might foul Ocean's arrestor wires before the arrestor hook itself engaged one; or was it to do with the crash barrier given that the barriers then in service were intended to stop propeller-driven runaways and might easily decapitate the pilot of a jet? LZ551 continued to be used for numerous carrier-related trials with many units until, on 15 September 1947, it was sold back to the manufacturers and subsequently preserved.



References: *British Prototype Aircraft* by Ray Sturtivant, Haynes Publishing Group; *Wings of Fame Volume 3 – Vulcan- Delta Force* by Paul Jackson

Avro Type 707, VX784, flown by Avro Deputy Chief Test Pilot, Flight Lieutenant Eric Esler, A&AEE Boscombe Down, September 1949.

After the war, aviation technology was moving apace rapidly. Following on from the pioneering work of Germany's Alexander Lippisch, Avro envisaged the tailless delta wing concept for their new Avro Type 698 bomber – which was to eventually become the Vulcan. However, this was untried technology, and it was proposed to build a series of 1/3rd scale flying prototypes to test the low-speed flight properties and characteristics of the new wing design. Following taxiing trials at Woodford, VX784 flew for the first time on 4 September 1949 from Boscombe Down with Eric Esler at the controls. Powered by a single Rolls Royce Derwent turbojet, the aircraft was unpainted natural metal apart from serials, post-war national insignia and Prototype 'P' markings. The flight was termed a success and was the first for a British tailless delta design. Following this, the aircraft was exhibited at the 1949 SBAC Show at Farnborough. However, its life was to be a short one as, on 30 September of that year, VX784 crashed at Blackbushe, killing Flt Lt Esler. Although the exact cause of the crash was never pinpointed, it is thought that the airbrakes locked open during a low speed manoeuvre, causing the aircraft to stall.

Chapter 2: The 1950s



Above: Built to test the tailless delta wing arrangement later to be used by the Avro Vulcan, Avro 707B, VX790, displays the later dorsal intake for its single R-R Derwent jet engine that replaced the original split intakes with which it was equipped for its first flight on 6 September 1950. Initially painted bright blue as seen here, VX790 was later painted overall silver which it retained until withdrawn from use in 1960. VX790 was either scrapped or burnt at Bedford shortly afterwards. (Please see the extensive illustration captions which accompany VX790 and others within the Avro 707 experimental jet series.)

Events such as the Berlin Airlift of 1948 to 1949 and the Korean War of 1950 to 1953, illustrated how 'hot' the Cold War between East and West had rapidly become in the immediate post-war years. The decade of the 1950s was one of significant work in aircraft design and technology in Britain, and this was reflected by the considerable demands of flight testing during that time. Principally involved was much diverse test work by both Farnborough and Boscombe Down and their related test establishments, in addition to considerable work by the wider aircraft industry itself.

A significant related development saw the opening of a new RAE at Bedford, (actually at Thurleigh airfield), as Britain's third but no less vital major official aviation test establishment alongside Farnborough and Boscombe Down. A considerable amount of work that had commenced following the end of World War Two, particularly in response to Allied investigations into German technology, came to fruition in the early 1950s with the increasing readiness of the new and increasingly extensive facilities at Thurleigh. Located just outside Bedford, it had been a USAAF bomber airfield, and it was completely transformed into a major new test establishment in the late 1940s and early 1950s.

As the war in Europe had neared its conclusion, it had become increasingly obvious to Allied scientists and designers that Germany was well ahead of the Allies in many areas of aviation research and development. The Germans had successfully introduced at least two jet-powered aircraft into front-line service by the end of the war – the Messerschmitt Me 262 and the Arado Ar 234 – together with one rocket-powered interceptor – the Messerschmitt Me 163. Many examples of these advanced aircraft and their powerplants were captured by the Allies. A significant number of German aircraft of various types were moved to Farnborough for evaluation, and important test work was carried out on some of them in the immediate post-war period.

A major task for the Allies at the end of the war was the tracking down of organisations and institutions where very advanced research and development had been carried out in Germany during the Nazi era. It was also necessary to locate the scientists and designers who had been associated with the many important and exceptional projects of the German aviation industry. One of the most significant of the German research centres was the *Luftfahrt Forschungsanstalt Hermann Göring* (LFA, Aeronautical Research Institute, also known as the Hermann Göring Research Institute), near Braunschweig (Brunswick). This was a significant research and development organisation, that had carried out a wide range of advanced research and was very well equipped with test facilities. These included wind tunnels, and important sections of the research centre were located underground.

This area of Germany came under British control after the war, and a major effort was duly made to transfer data, scientists, and eventually actual equipment, to Britain. Some of this equipment was eventually set up at the new RAE Bedford site, which was built on a grand scale at considerable expense to the British taxpayer. Indeed there had been a plan at one stage to develop the Bedford location into a 'super airfield', featuring an extremely long runway with the amalgamation of the sites of three former wartime airfields of Thurleigh, Twinwood Farm, and Little Staughton. The resulting research institution would have been named the National Aeronautical Establishment (NAE), but in the event this grand plan was not realised, and RAE Bedford operated as a highly significant out-station to RAE Farnborough during its existence as a flight test centre. Nevertheless it became a major organisation in its own right, and performed important research and development into high-speed flight and allied aerodynamic examination as well as many other related issues.

Originally stationed at Farnborough, its flight test department (Aero Flight) came to operate a number of highly important flight

test aircraft from the 1950s onwards, and several specific research departments moved from Farnborough to Bedford during the existence of the latter site. Amongst these was the naval air department.

At Boscombe Down, a number of significant developments took place during the decade. Much of the post-war expansion of the airfield's facilities was completed in the late 1940s and early 1950s, this including the construction of two further runways to go with the original hard runway of the mid-1940s – the access to which was also improved. In 1950 a major organisation moved onto the site with the arrival from RAF Beaulieu in Hampshire of the Airborne Forces Experimental Establishment (AFEE). This unit had originally been formed in 1941 at Ringway, and over the years had become involved in the development of the aerial delivery of all types of airborne cargo. This included paratroops, supplies, and even large loads such as field guns. A great deal of the establishment's work had additionally and vitally been centred on glider development work, with glider-towing by converted four-engined bomber types being particularly important.

On joining the A&AEE from September 1950 onwards, it became one of the establishment's test divisions, and formed a new D Squadron at Boscombe Down. The AFEE was not the only major organisation that came to Boscombe Down during that period, for in July 1956 the final part of the Marine Aircraft Experimental Establishment was absorbed into the A&AEE. This organisation had been associated for many years with Felixstowe, having originally been formed in 1915 as the

Seaplane Experimental Station, and subsequently re-named as the Marine Aircraft Experimental Establishment in April 1924. It had been highly important in the development of military flying-boats and many related marine aircraft functions, but its work finally ran down as Boscombe Down continued its work as the pre-eminent centre for services-related flight testing, evaluation and release for front-line service.

The disastrous decision to cancel the Miles M.52 programme was finally seen, even at the highest levels of government, to have been extremely unwise. Britain eventually embarked during the 1950s, albeit well behind her competitors, on the research necessary to create a viable supersonic front-line combat aircraft. Much of the data obtained from Germany at the end of World War Two proved to be very useful in this quest, and a considerable amount of activity ensued in R&D, design, and the construction of research aircraft to explore possible configurations. This included research into suitable wing planforms, all of which needed to be flight tested. Swept-back wings, crescent-shaped wings and delta shapes became highly significant in subsequent research.

The development of nuclear weapons also created its own requirements for the establishment of a viable airborne nuclear deterrent, resulting in considerable design work and flight testing to find a suitable airborne platform to deliver nuclear weapons. An Advanced Bomber Project Group was formed to aid in the creation of a suitable manned nuclear bomber force, which received much input from RAE Farnborough into possible designs. This eventually led to the

successful adoption into front-line RAF service of the Avro Vulcan, Handley-Page Victor, and Vickers Valiant, each one of which dated from official Specifications of the late-1940s after the end of World War Two.



Left: The Supermarine Type 535, VV119, had first flown in March 1950, only at that time it was the Type 528 with a tailwheel undercarriage. Two months later it was grounded prior to receiving a host of changes of which the most obvious was the addition of a nosewheel (while retaining the original twin tailwheel as a 'tail bumper') and, much less obviously, a four foot increase in length plus an afterburner for its Nene engine. VV119, now the Type 535, first flew in its revised form on 23 August 1950 and lit its afterburner for the first time eight days later. Effectively VV119 became the lead-in prototype to the two Avon-powered Supermarine Swift prototypes WJ960 and WJ965, but it's worth noting that some sources insist VV119 was the Swift prototype whilst referring to WJ960 and WJ965 as 'pre-production' Swifts! Historical ambiguities aside, the essential truth for readers 'of a certain age' is that VV119 was, and always will be, Prometheus – the star performer in the 1950's British movie Sound Barrier. VV119's actual fate was less dramatic than that of Prometheus as it became maintenance airframe 7285M at Halton on 23 September 1955 and was later scrapped.



Left: The prototype Venom NF.2 night fighter was first flown as a private venture by the De Havilland company in August 1950 by test pilot John Derry – hence the B condition identification G-5-3. Standard Venom wings and tail booms as fitted to single seat Venoms were married to a new, wider, fuselage accommodating two crewmen side by side for better crew efficiency than that achieved in a tandem seat arrangement. The venture was successful and production orders for the RAF followed. G-5-3 later received the serial WP227 and was sent to the A&AEE for evaluation on behalf of the RN which led to the development of the Sea Venom FAW.20 for the Fleet Air Arm. Its work done, WP227 was grounded and became maintenance airframe 7098M in July (or September) 1953 and was SOC in December 1956.

The decade of the 1950s saw the general adoption of a new system of official Specifications. The procedures that had been put in place with the specifications system of the 1920s finally came to an end during 1949. The last-ever official Specification under that particular system, that led to a production front-line type, was Specification F.23/49. This resulted in the English Electric P.1 series, better known in its production form as the Lightning. The new system that was generally adopted from the early 1950s onwards retained an initial prefix letter, or letters, to denote role or category, but was followed by a simple numbering system that started at 100.

The very first Specification under this new system was Specification ER.100 for a swept-wing research aircraft, which led to the Short SB.5. A suffix letter could also be added to the end of the Specification's designation, to show the progress of the Specification - either at the industry tendering stage ('T'), or the development stage ('D'), or when the manufacture of a prototype had been reached ('P'). By that period the creation of a Specification had become dependant on the issuing of an initial Operational Requirement (OR), or an Air Staff Target (AST), Naval Air Staff Target (NAST), or later a Staff Requirement/Air (SR/A). In fact the whole system of the initial raising of an official requirement by the military had been overhauled in the early 1940s with the inception of Air Publication (AP) 970, which intended to form the guidelines within a single source of all the stages that were required in the creation of a new design - from the initial recognition of the need for a particular type, right through to the service introduction of the ensuing design. This aimed, and partly succeeded, in eliminating time delays and considerable unnecessary paperwork.

The quest for supersonic speed had a number of spin-offs, the most visible of which was the capturing for Britain of the prestigious world air speed record. On 10 March 1956 a Fairey Delta 2 research and trials aircraft (WG774) was flown by Peter Twiss to a new world record speed of just over 1,132mph (1,822km/h) on two runs over a timed course above southern

England. This bettered the previous record, achieved by a North American F-100C Super Sabre, by some 310mph (499km/h) - the largest single margin by which the world speed record for aircraft had ever been increased. Although Britain had held speed records before in the post-war period, this particular achievement was a genuine and very positive milestone for Britain's still-great aircraft industry, and it was the first air speed record to exceed the 1,000mph (1,609km/h) barrier.

Unfortunately, in the same way that the Miles M.52 cancellation had been a major disaster in the immediate post-war era, so the 1950s also suffered a milestone catastrophe for the aircraft industry in Britain. In the spring of 1957, the Conservative government's Minister of Defence, Duncan Sandys, proclaimed that all work on future fighter projects would stop after the supersonic English Electric P.1 (Lightning) programme so that ground-to-air missile systems would henceforth provide Britain's air defence - and that manned bombers would no longer be needed in the future.

His plans formed a part of what was to become a notorious White Paper, issued in April 1957, which was one of the most significant in the history of Britain's aviation industry. In effect this unbelievable piece of policy-making by the government of the day spelled complete disaster for important sections of Britain's aircraft industry, as well as for many research and development programmes, and their associated flight testing.

Although fortunately none of Sandys' predictions came true, the damage had been done. It is possible to chart the decline of significant aspects of Britain's aviation infrastructure from the 1960s onwards due to this and subsequent inexplicable official reasoning, as reflected in various subsequent Defence Reviews, which were in effect nothing but significant defence cuts. In the short-term it meant the death of several promising projects, including possible front-line developments of the Fairey Delta 2 design that had successfully gained the world air speed record for Britain in 1956.

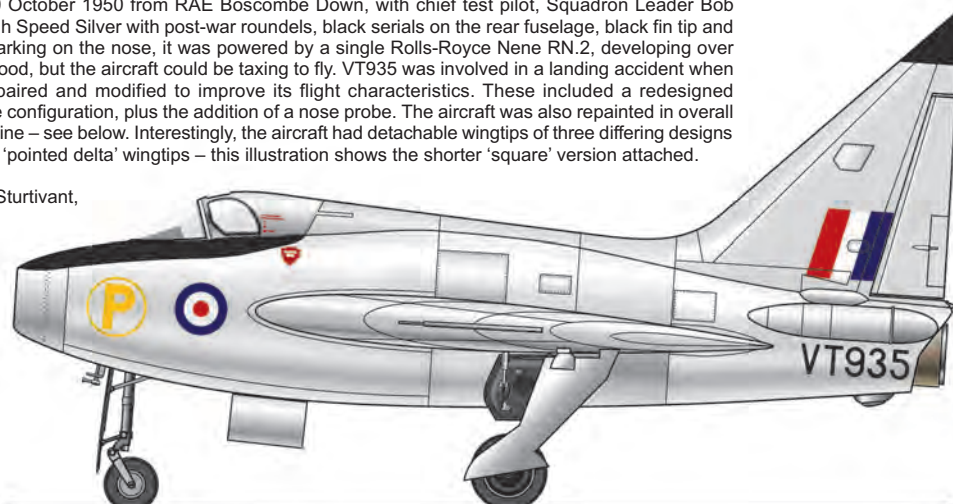
Below: Boulton Paul's Nene-powered P.111 was an experimental aircraft designed to explore the characteristics of tailless delta-winged flight. VT935 first flew on 10 October 1950 from Boscombe Down for which flight reports were good although the aircraft was described by one test pilot as '...touchy'! Following a landing accident VT935 was repaired and received various improvements, while a nose probe and a coat of overall gloss yellow paint with a black fuselage cheatline was also applied. Following the accident and subsequent modifications, VT935 was redesignated the P.111A and first flew as such from Boscombe Down on 2 July 1953. VT935, its flying life over, went to the Cranfield College of Aeronautics for use as an instructional airframe in 1958. This photo was taken there some time later, at which time the (removeable) fin tip extension was in situ although the equivalent wing tip extensions, and the nose probe, had been removed.



Boulton-Paul P.111, VT935, RAE Boscombe Down, October 1950

Boulton-Paul's P.111, VT935, first flew on 10 October 1950 from RAE Boscombe Down, with chief test pilot, Squadron Leader Bob Smythe at the controls. Finished in overall High Speed Silver with post-war roundels, black serials on the rear fuselage, black fin tip and anti-glare panel and a Yellow prototype 'P' marking on the nose, it was powered by a single Rolls-Royce Nene RN.2, developing over 5,000lb thrust. Flight reports were generally good, but the aircraft could be taxing to fly. VT935 was involved in a landing accident when the landing gear failed to extend. It was repaired and modified to improve its flight characteristics. These included a redesigned windscreen, undercarriage doors and airbrake configuration, plus the addition of a nose probe. The aircraft was also repainted in overall gloss bright yellow with a black fuselage cheatline – see below. Interestingly, the aircraft had detachable wingtips of three differing designs to allow for comparison between 'square' and 'pointed delta' wingtips – this illustration shows the shorter 'square' version attached.

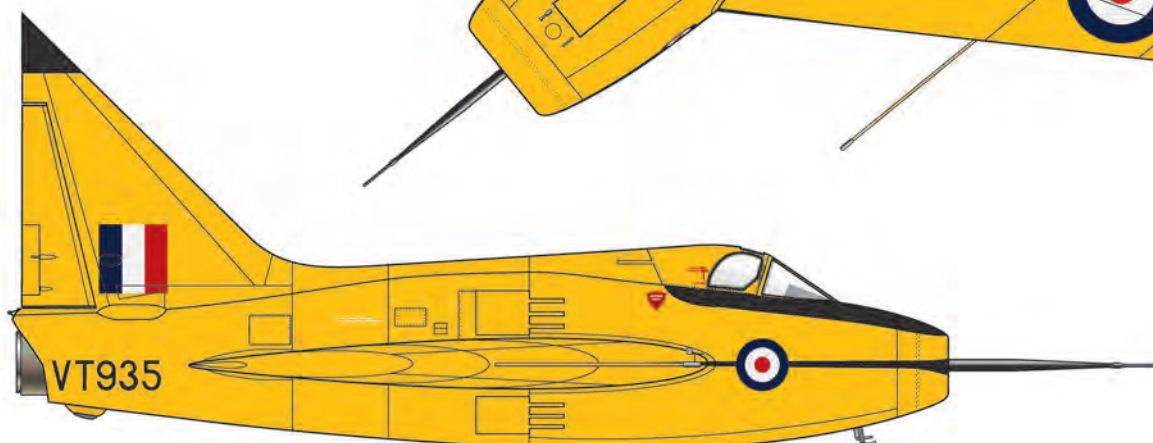
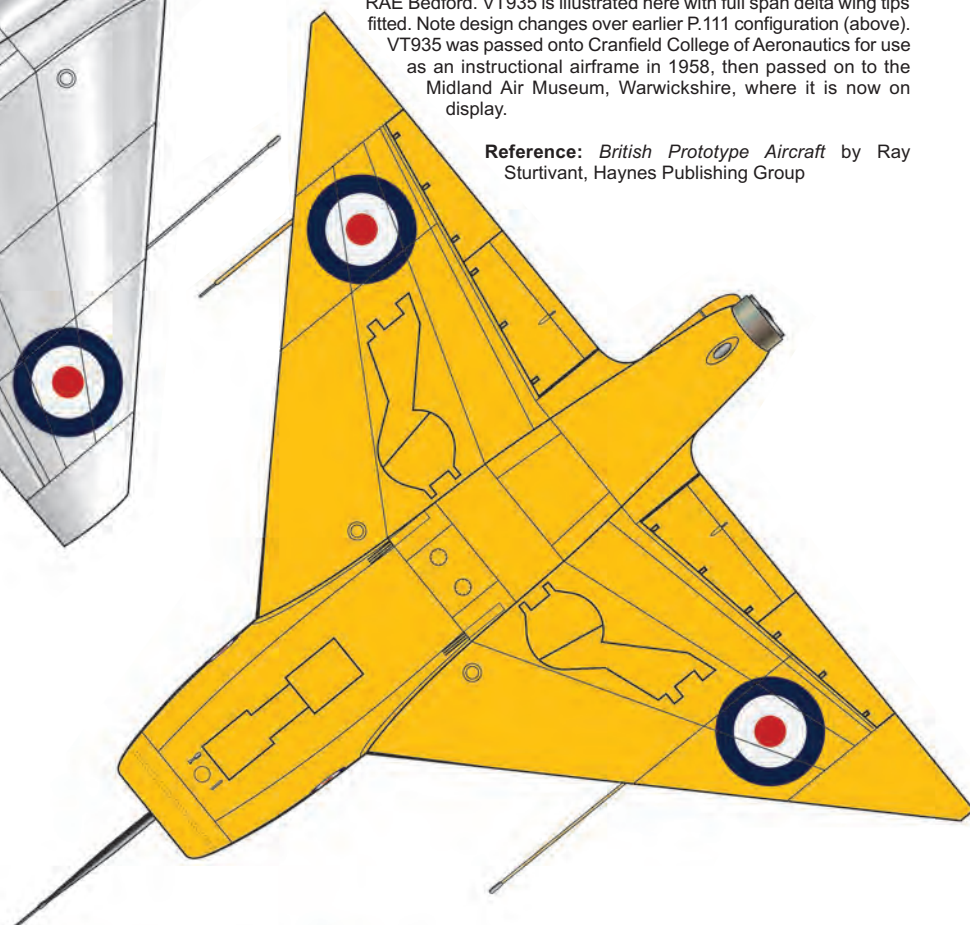
Reference: *British Prototype Aircraft* by Ray Sturtivant, Haynes Publishing Group

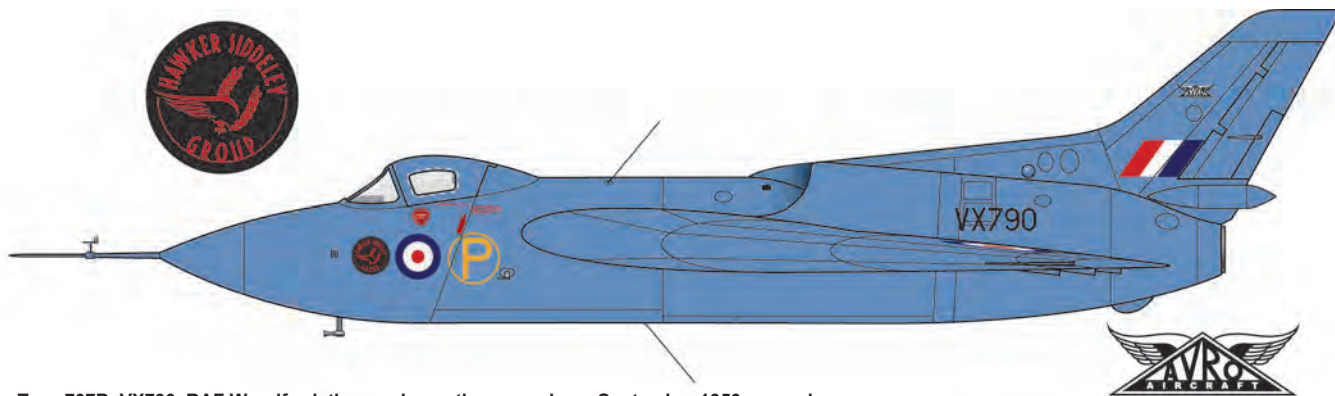
**Boulton Paul P.111A, VT935, RAE Boscombe Down, July 1953**

In 1953, VT935 was redesigned the P.111A. It was painted overall bright yellow (Golden Yellow BS381C 356), with black cheatline, probe, fin tip and anti-glare panel. It soon acquired the nickname 'Yellow Peril' in this scheme and first flew from Boscombe Down on 2 July 1952. Later, the anti-spin parachute housing was modified to be used as a braking parachute, and a power control system was also modified to give easier control and VT935 was passed on to RAE Bedford. VT935 is illustrated here with full span delta wing tips fitted. Note design changes over earlier P.111 configuration (above).

VT935 was passed onto Cranfield College of Aeronautics for use as an instructional airframe in 1958, then passed on to the Midland Air Museum, Warwickshire, where it is now on display.

Reference: *British Prototype Aircraft* by Ray Sturtivant, Haynes Publishing Group

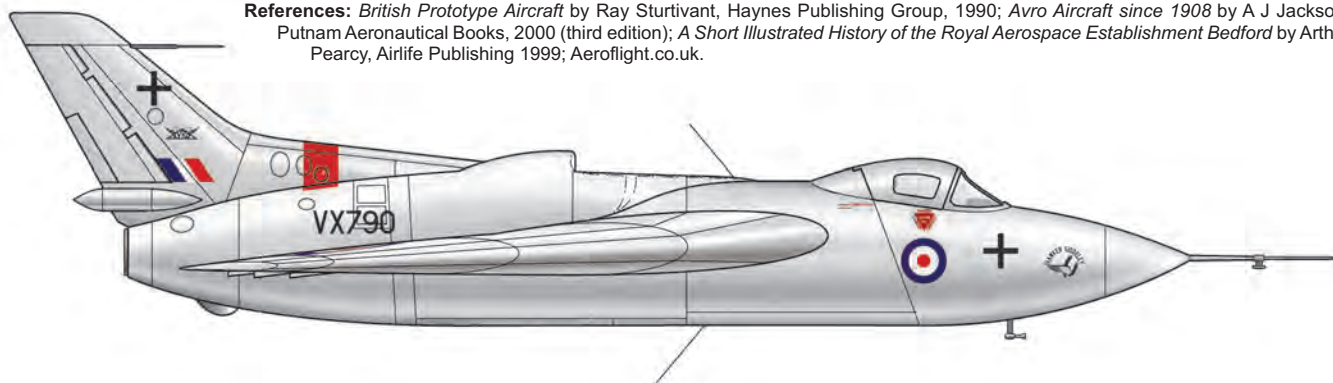




Avro Type 707B, VX790, RAF Woodford, then various other occasions, September 1950 onwards

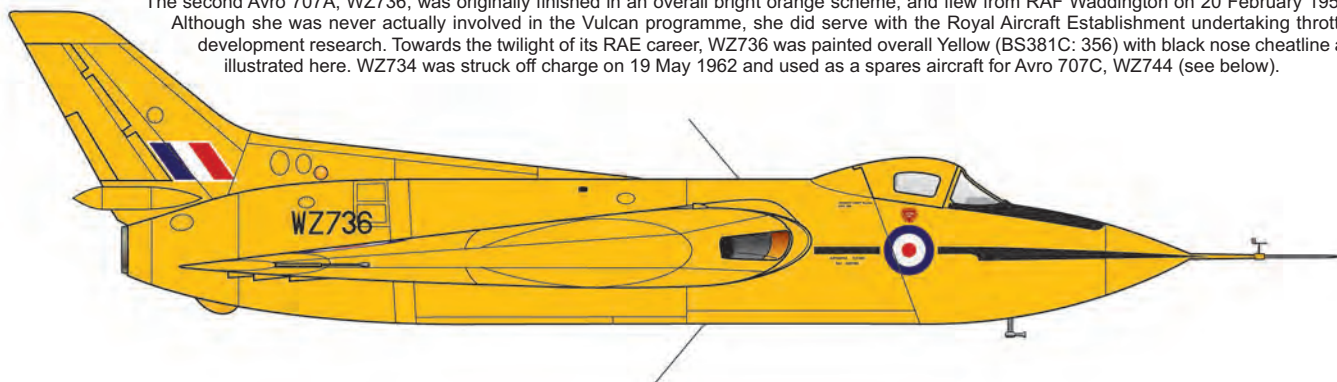
VX790 was actually the second Avro 707 to fly, taking to the skies on its first flight from RAE Boscombe Down on 6 September 1950 with Avro Chief Test Pilot, Roland 'Roly' Falk at the controls. VX790, which received the 707B designation was some twelve feet longer than first 707, VX784, and incorporated the nose section intended for the still under development Avro 707A (see opposite). Power was again courtesy of a single Rolls Royce Derwent 5, but the new aircraft incorporated a number of changes and improvements. Chief amongst these was a new wing layout with redesigned leading edge sweep, and airbrakes moved from the fuselage to new positions above and below the wings. Initially, the bifurcated engine intake of the original design was retained as can be seen in the top profile, although this gave way to a single NACA-type in February 1951. Problems encountered with airflow disruption caused by the canopy led Avro to re-evaluate the intake design for the 707A. Flight testing from Dunsfold continued until a landing accident on 21 September 1951 forced a return to Woodford for repair. The aircraft spent the rest of its career at Boscombe Down where it was again damaged in a landing accident during September 1956. Thereafter it served at RAE Bedford, where it ended its days as a spares source for Avro 707A WZ736 and the sole Avro 707C WZ744 (see below). Following the British aviation industry's penchant at the time for bright prototype schemes, VX790 was finished overall in a light blue. This gave way to an overall High Speed Silver finish which it retained to its final days. As can be seen, a variety of marking positions and permutations were carried throughout its life, although it is hard to ascertain the precise time periods involved.

References: *British Prototype Aircraft* by Ray Sturtivant, Haynes Publishing Group, 1990; *Avro Aircraft since 1908* by A J Jackson, Putnam Aeronautical Books, 2000 (third edition); *A Short Illustrated History of the Royal Aerospace Establishment Bedford* by Arthur Percy, Airlife Publishing 1999; *Aeroflight.co.uk*.



Avro Type 707A, WZ736, Royal Aircraft Establishment, mid-1950s

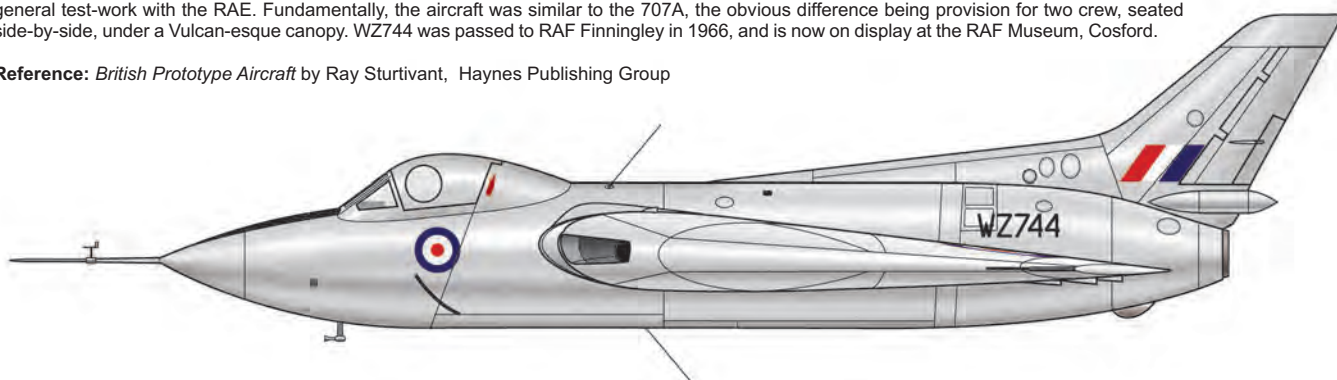
The second Avro 707A, WZ736, was originally finished in an overall bright orange scheme, and flew from RAF Waddington on 20 February 1953. Although she was never actually involved in the Vulcan programme, she did serve with the Royal Aircraft Establishment undertaking throttle development research. Towards the twilight of its RAE career, WZ736 was painted overall Yellow (BS381C: 356) with black nose cheatline as illustrated here. WZ734 was struck off charge on 19 May 1962 and used as a spares aircraft for Avro 707C, WZ744 (see below).



Avro Type 707C WZ744, Royal Aircraft Establishment, July 1953

This fourth profile shows WZ744, the sole Avro 707C built. Finished in overall natural metal with post-war National markings and black serials and anti-glare panel, it was conceived as a dual-seat conversion trainer, and made its initial flight on 1 July 1953 with Squadron Leader T B Wales at the controls. Two Avro 707Cs were contracted, the other being WZ739, but as the Vulcan proved to be an easy aircraft to convert to, WZ739 was cancelled leaving WZ744 to carry on general test-work with the RAE. Fundamentally, the aircraft was similar to the 707A, the obvious difference being provision for two crew, seated side-by-side, under a Vulcan-esque canopy. WZ744 was passed to RAF Finningley in 1966, and is now on display at the RAF Museum, Cosford.

Reference: *British Prototype Aircraft* by Ray Sturtivant, Haynes Publishing Group



Avro Type 707A WD280, Royal Aircraft Establishment, June 1951 - February 1953

The first Avro 707A, WD280, first flew from Boscombe Down on 14 June 1951. Despite the aircraft's 'A' Type designation, it actually followed the Avro 707B (opposite); that aircraft Type making its maiden flight in September the previous year. However, unlike the Avro 707B, the Avro 707A was designed to explore the high subsonic end of the speed envelope. Studies with the 707B had shown that airflow to the dorsal-mounted engine intake became inefficient at higher speeds due to disruption caused by the canopy. A redesign was undertaken, and the intakes moved to the wing root leading edges as with the Type 698 (Vulcan) prototype.

Initially, WD280 was finished in an overall colour unofficially termed 'Salmon Pink', but this scheme gave way to an overall gloss red as illustrated. On 13 November 1951 an order was placed for three more aircraft; a second 707A, and two side-by-side trainers to be designated 707C, although as related opposite, one of these was later cancelled.

WD280 was fitted with a kinked delta wing as introduced in the later 'Phase Two' Vulcan wing modifications – see ghosted areas at wing leading edges on the plan views.

In 1956, WD280 was passed over to the Australian Aeronautical Research Council (AARC), and transported from Renfrew to Fisherman's Bend, Melbourne, aboard HMAS Melbourne, arriving at RAAF Laverton where she was repainted overall silver and operated by the Aircraft Research and Development Unit (ARDU). WD280 stayed there until she was struck off charge on 10 February 1967 and was sold for £400 to an Australian private collector, Mr Geoffrey Mallett who kept the aircraft in his garden! She was finally bought by the RAAF Museum in 1999, where she is now being restored with the help of Mr Mallett.

Summary of Avro 707 colours

Avro 707: Single aircraft – VX784. Overall unpainted finish.

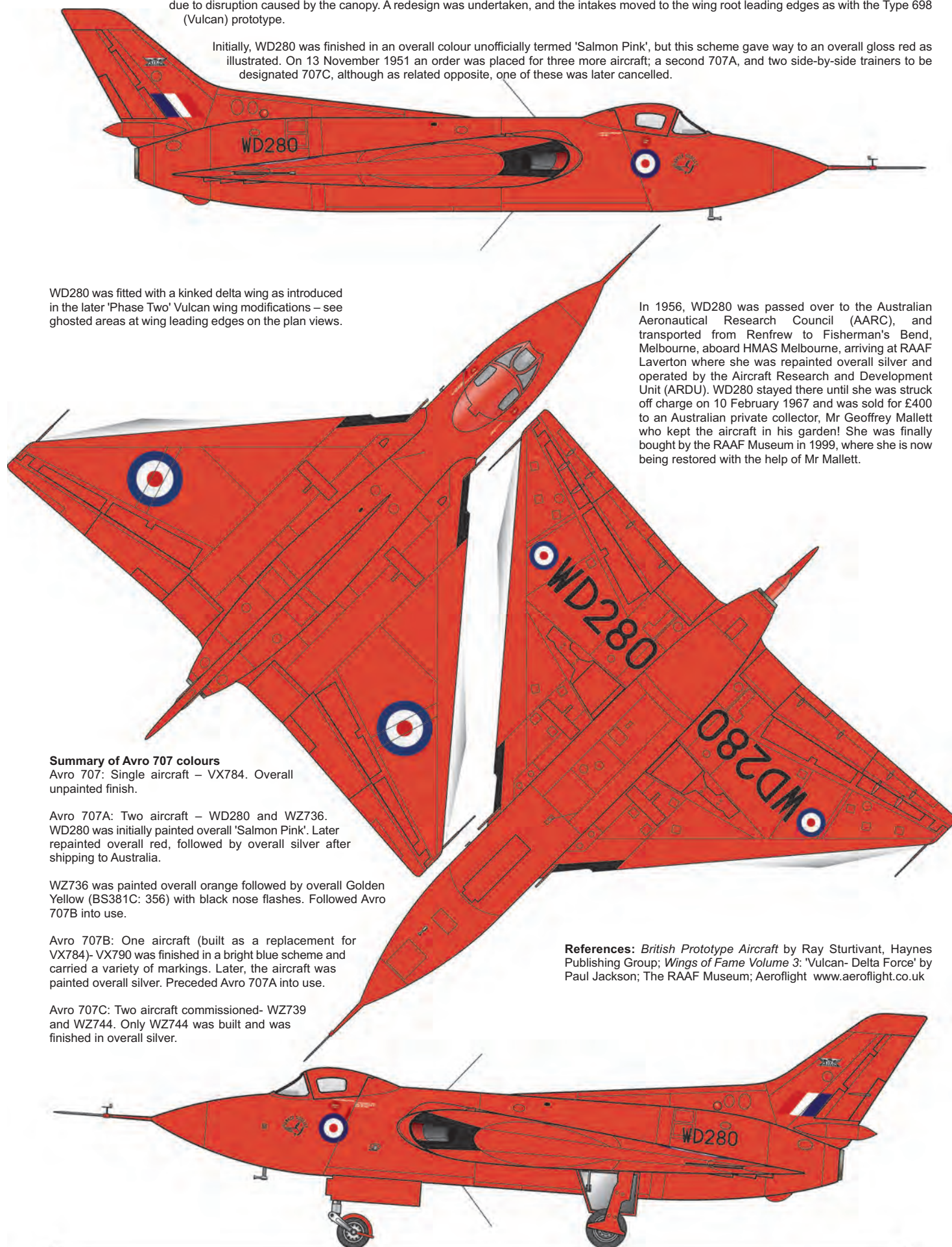
Avro 707A: Two aircraft – WD280 and WZ736. WD280 was initially painted overall 'Salmon Pink'. Later repainted overall red, followed by overall silver after shipping to Australia.

WZ736 was painted overall orange followed by overall Golden Yellow (BS381C: 356) with black nose flashes. Followed Avro 707B into use.

Avro 707B: One aircraft (built as a replacement for VX784)- VX790 was finished in a bright blue scheme and carried a variety of markings. Later, the aircraft was painted overall silver. Preceded Avro 707A into use.

Avro 707C: Two aircraft commissioned- WZ739 and WZ744. Only WZ744 was built and was finished in overall silver.

References: *British Prototype Aircraft* by Ray Sturtivant, Haynes Publishing Group; *Wings of Fame Volume 3: 'Vulcan- Delta Force'* by Paul Jackson; The RAAF Museum; Aeroflight www.aeroflight.co.uk





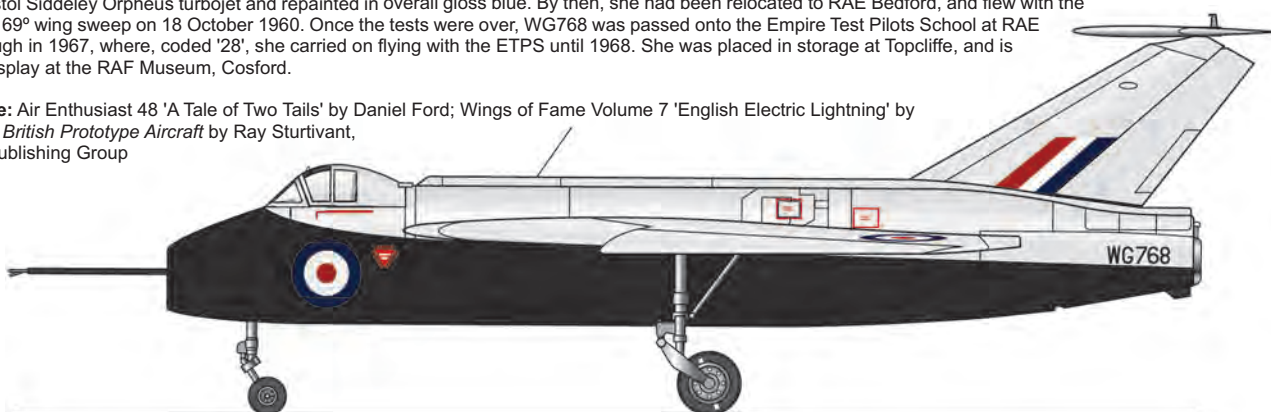
Short SB.5, WG768, A&AEE Boscombe Down and ETPS, RAE Farnborough, December 1952 to October 1960

Initially painted overall High Speed Silver with black under surfaces, (see top profile), WG768 was repainted in 1960 in overall gloss blue (bottom profile). Serials for the silver and black scheme were black, whilst those for blue scheme were white. Latterly, the blue scheme carried small RAE crest on nose. The Short SB.5 was constructed to explore the low speed performance of the wing and tail design proposed by English Electric for use on their P.1 prototype. Powered by a single Rolls Royce Derwent turbojet, the aircraft featured a unique characteristic, in that the wing and tailplanes were interchangeable.

Three different wing sweep configurations were available – 50°, 60° and 69°. The tailplane could be high or low-set. The undercarriage was fixed as the aircraft was only intended for low-speed flight. Resplendent in its original silver and black finish, WG768 first flew from A&AEE Boscombe Down on 2 December 1952 with Short's Chief Test Pilot, Tom Brooke-Smith, at the controls. On this occasion, the aircraft flew with 50° wing sweep and a high set tailplane. In the summer of 1953, the wing sweep angle was increased to the 60° option, however the tailplane was left in the 'high' position. The aircraft was then reconfigured to the low-set tailplane position (still with 60° wing sweep) in January 1954, and it carried on flying in this layout until October 1960. WG768 was then fitted with a Martin Baker ejection seat, re-engined with a Bristol Siddeley Orpheus turbojet and repainted in overall gloss blue. By then, she had been relocated to RAE Bedford, and flew with the maximum 69° wing sweep on 18 October 1960. Once the tests were over, WG768 was passed onto the Empire Test Pilots School at RAE Farnborough in 1967, where, coded '28', she carried on flying with the ETPS until 1968. She was placed in storage at Topcliffe, and is now on display at the RAF Museum, Cosford.



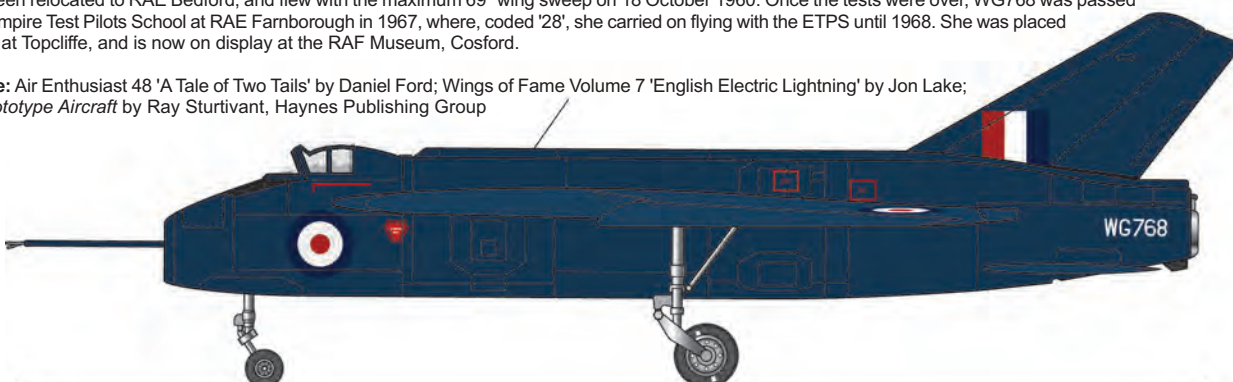
Reference: Air Enthusiast 48 'A Tale of Two Tails' by Daniel Ford; Wings of Fame Volume 7 'English Electric Lightning' by Jon Lake; *British Prototype Aircraft* by Ray Sturtivant, Haynes Publishing Group

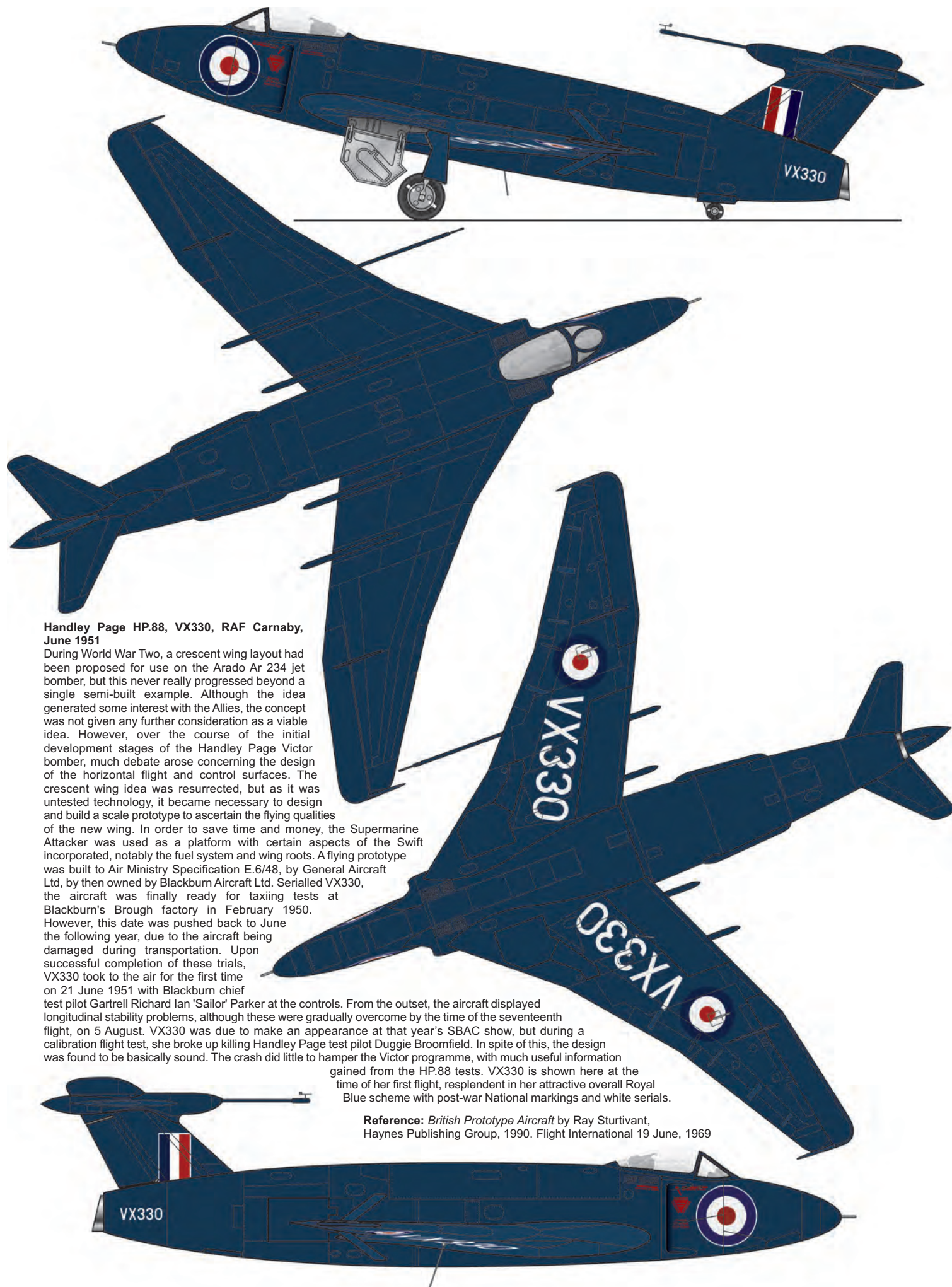


Short SB.5, WG768, A&AEE Boscombe Down and ETPS, RAE Farnborough, December 1952 to October 1960

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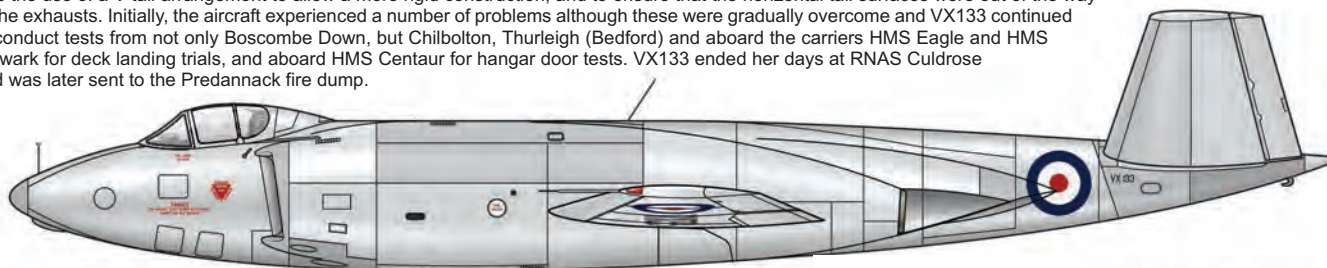
Handley Page HP.88, VX330, RAF Carnaby, June 1951

During World War Two, a crescent wing layout had been proposed for use on the Arado Ar 234 jet bomber, but this never really progressed beyond a single semi-built example. Although the idea generated some interest with the Allies, the concept was not given any further consideration as a viable idea. However, over the course of the initial development stages of the Handley Page Victor bomber, much debate arose concerning the design of the horizontal flight and control surfaces. The crescent wing idea was resurrected, but as it was untested technology, it became necessary to design and build a scale prototype to ascertain the flying qualities of the new wing. In order to save time and money, the Supermarine Attacker was used as a platform with certain aspects of the Swift incorporated, notably the fuel system and wing roots. A flying prototype was built to Air Ministry Specification E.6/48, by General Aircraft Ltd, by then owned by Blackburn Aircraft Ltd. Serialled VX330, the aircraft was finally ready for taxiing tests at Blackburn's Brough factory in February 1950. However, this date was pushed back to June the following year, due to the aircraft being damaged during transportation. Upon successful completion of these trials, VX330 took to the air for the first time on 21 June 1951 with Blackburn chief test pilot Gartrell Richard Ian 'Sailor' Parker at the controls. From the outset, the aircraft displayed longitudinal stability problems, although these were gradually overcome by the time of the seventeenth flight, on 5 August. VX330 was due to make an appearance at that year's SBAC show, but during a calibration flight test, she broke up killing Handley Page test pilot Duggie Broomfield. In spite of this, the design was found to be basically sound. The crash did little to hamper the Victor programme, with much useful information gained from the HP.88 tests. VX330 is shown here at the time of her first flight, resplendent in her attractive overall Royal Blue scheme with post-war National markings and white serials.

Reference: *British Prototype Aircraft* by Ray Sturtivant, Haynes Publishing Group, 1990. *Flight International* 19 June, 1969

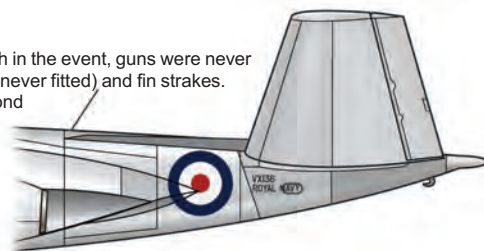
Supermarine Type 508, VX133, A&AEE Boscombe Down, August 1951

The Supermarine Type 508 was developed from the Supermarine Type 505, which was planned for the 'flexible deck' theory, (of belly landing on the deck of a standard carrier on to a mat of thick rubber which was found to be impractical), and never flew. The 505 was redesigned with a standard tricycle undercarriage layout and re-designated Type 508. Finished in overall natural metal, with 32 inch diameter roundels on the fuselage and wing upper and lower surfaces, 4 inch high black serial number on the rear fuselage and 24 inch high under the wings, VX133 was powered by two AJ.65 turbojets and first flew from Boscombe Down on 31 August 1951 with Vickers Supermarine Chief Test Pilot Michael John 'Mike' Lithgow at the controls. The most radical aspect of the aircraft was the use of a V-tail arrangement to allow a more rigid construction, and to ensure that the horizontal tail surfaces were out of the way of the exhausts. Initially, the aircraft experienced a number of problems although these were gradually overcome and VX133 continued to conduct tests from not only Boscombe Down, but Chilbolton, Thurleigh (Bedford) and aboard the carriers HMS Eagle and HMS Bulwark for deck landing trials, and aboard HMS Centaur for hangar door tests. VX133 ended her days at RNAS Culdrose and was later sent to the Predannack fire dump.

**Inset: Supermarine Type 529 VX136 rear fuselage section showing dorsal strakes**

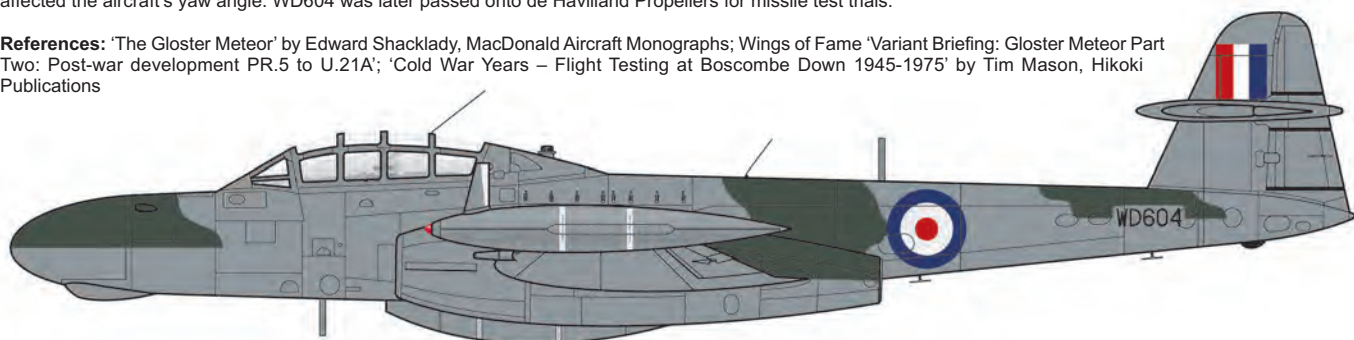
Essentially similar to VX133, VX136 was able to accept armament, (VX133 only had the gun ports), although in the event, guns were never fitted. The main changes to this aircraft were in the tail area, with provision for rearward facing radar (again, never fitted) and fin strakes. Making its first flight on 29 September 1952, VX136 undertook a series of tests until it was damaged beyond repair in a landing accident in December 1953. The airframe ended its days as a gunnery target at the Proof & Experimental Establishment (P&EE) at Shoeburyness.

Reference: 'Scimitar- Supermarine's Last Fighter' by Richard A. Franks; Dalrymple & Verdun Publishing.

**Armstrong Whitworth Meteor NF.11, WD604, A&AEE Boscombe Down, February 1952**

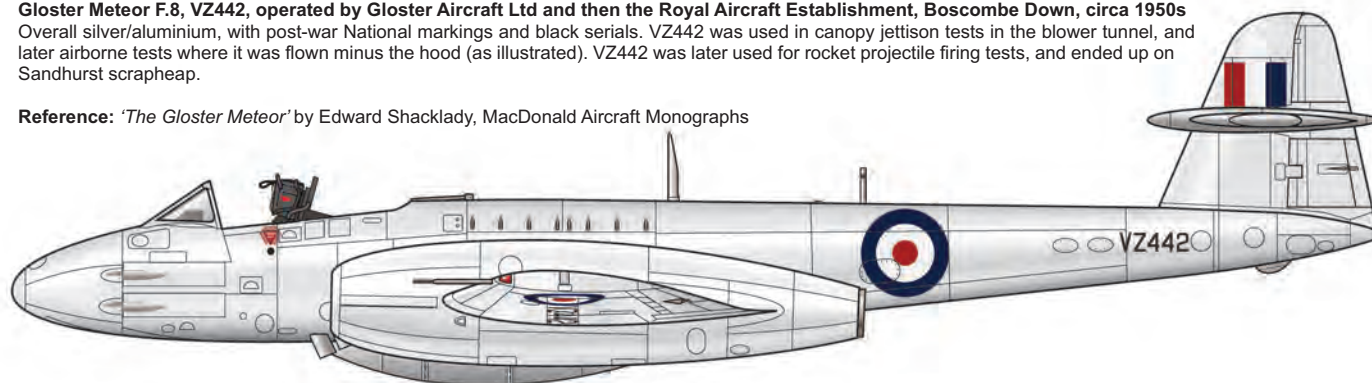
WD604 was used in trials of jettisonable wingtip tanks, which were found to be a better design for jettisoning than the underwing type. Finished in the standard Night Fighter scheme of Medium Sea Grey overall with Dark Green disruptive pattern on the upper surfaces, with post-war National markings and black serials, the lower portion of nose appears to be a slightly lighter shade. Each tank was fitted with a vertical dorsal fin towards the front, the rear section of which appears to be white. Of note is the camera mounted behind cockpit, positioned to photograph each tank as it flew past the fin. In the event, the layout was not proceeded with as jettisoning affected the aircraft's yaw angle. WD604 was later passed onto de Havilland Propellers for missile test trials.

References: 'The Gloster Meteor' by Edward Shacklady, MacDonald Aircraft Monographs; Wings of Fame 'Variant Briefing: Gloster Meteor Part Two: Post-war development PR.5 to U.21A'; 'Cold War Years – Flight Testing at Boscombe Down 1945-1975' by Tim Mason, Hikoki Publications

**Gloster Meteor F.8, VZ442, operated by Gloster Aircraft Ltd and then the Royal Aircraft Establishment, Boscombe Down, circa 1950s**

Overall silver/aluminium, with post-war National markings and black serials. VZ442 was used in canopy jettison tests in the blower tunnel, and later airborne tests where it was flown minus the hood (as illustrated). VZ442 was later used for rocket projectile firing tests, and ended up on Sandhurst scrapheap.

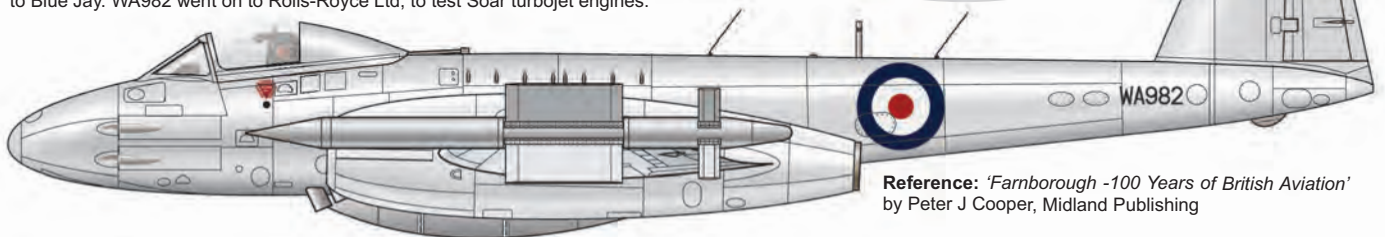
Reference: 'The Gloster Meteor' by Edward Shacklady, MacDonald Aircraft Monographs



Left: Flying shot of the Gloster 'Prone' Meteor F.8, WK935, from the Royal Aircraft Establishment and Institute of Aviation Medicine at Farnborough, seen in February 1954. It would appear that the extended nose portion was of a slightly darker (fresher?) natural metal shade than the rest of the fuselage. (see illustration opposite)

Gloster Meteor F.8, WA982, Royal Aircraft Establishment, Farnborough, prior to Boscombe Down delivery for handling trials, November 1951

Finished in overall Aluminium/High Speed Silver, with post-war national markings and black serials, WA982 was fitted with a Red Hawk missile mock-up mounted on each wing tip to test the aerodynamic properties of this weapon. Red Hawk was later downgraded to Pink Hawk, then to Blue Jay. WA982 went on to Rolls-Royce Ltd, to test Soar turbojet engines.



Gloster Meteor F.4, RA490, Royal Aircraft Establishment, Farnborough, August 1954

RA490 was fitted with two Rolls-Royce Nene turbojets mounted ahead of the wing, thought to be by the National Gas Turbine Establishment, then further modified with an F.8 type fin and jet deflectors on the tailplanes, by Westland Aircraft Ltd. Finished in overall Aluminium/High Speed Silver with black serials and post-war national markings, the aircraft was used to investigate lowering stalling speeds by jet deflection. RA490 first flew in this configuration at Westland's in May 1954 in the hands of Westland chief test pilot, Sqn Ldr Leo de Vigne, then went onto Farnborough in August of the same year for test flights. The idea was not proceeded with due to increased weight penalties.

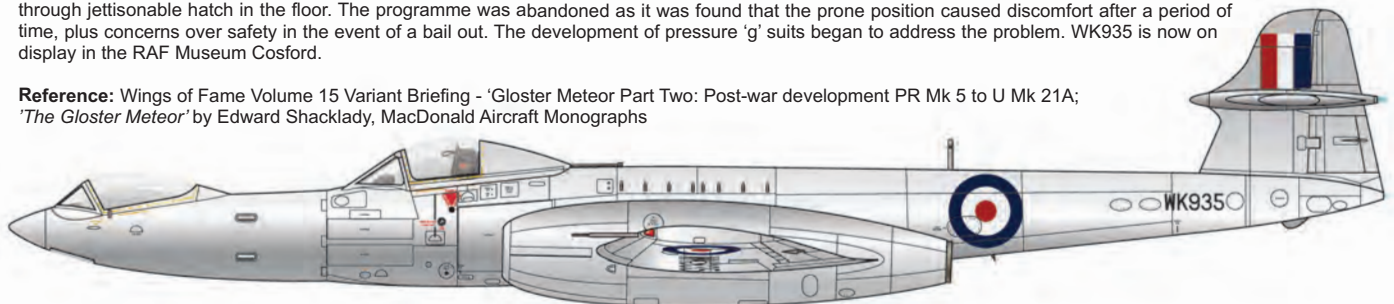
References: 'Meteor - 'Gloster's First Jet Fighter' by Steven J Bond, Midland Counties Publications Ltd; 'The Gloster Meteor' by Edward Shacklady, MacDonald Aircraft Monographs; Wings of Fame Volume 14 - Variant Briefing 'Gloster Meteor - Part One: Wartime development F.9/40 to F Mk 4'



Gloster Meteor F.8, WK935, Royal Aircraft Establishment and Institute of Aviation Medicine, Farnborough, February 1954

WK935 was modified by Armstrong-Whitworth Aircraft Ltd and made its first flight on 10 February 1954. Finished in overall Aluminium/High Speed Silver with standard post-war markings, the extended nose portion had a slightly darker shade to the rest of the fuselage. The aircraft was designed to test theory that incurred 'g' was lower on the body if in a prone position. A second pilot lay on padded couch in the extended nose with arm and chin rests. Control was by means of hanging pedals and a short control column. The main cockpit was occupied by a 'safety' pilot. In the event of ejection, the prone pilot slid backwards off his couch and through jettisonable hatch in the floor. The programme was abandoned as it was found that the prone position caused discomfort after a period of time, plus concerns over safety in the event of a bail out. The development of pressure 'g' suits began to address the problem. WK935 is now on display in the RAF Museum Cosford.

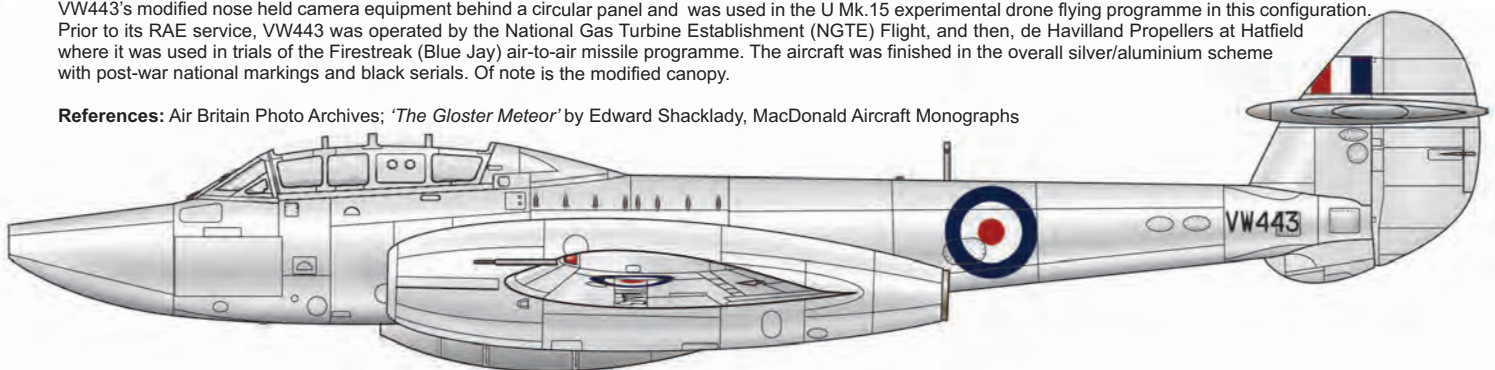
Reference: Wings of Fame Volume 15 Variant Briefing - 'Gloster Meteor Part Two: Post-war development PR Mk 5 to U Mk 21A; 'The Gloster Meteor' by Edward Shacklady, MacDonald Aircraft Monographs



Gloster Meteor T.7, VW443, Royal Aircraft Establishment, Farnborough, September 1957

VW443's modified nose held camera equipment behind a circular panel and was used in the U Mk.15 experimental drone flying programme in this configuration. Prior to its RAE service, VW443 was operated by the National Gas Turbine Establishment (NGTE) Flight, and then, de Havilland Propellers at Hatfield where it was used in trials of the Firestreak (Blue Jay) air-to-air missile programme. The aircraft was finished in the overall silver/aluminium scheme with post-war national markings and black serials. Of note is the modified canopy.

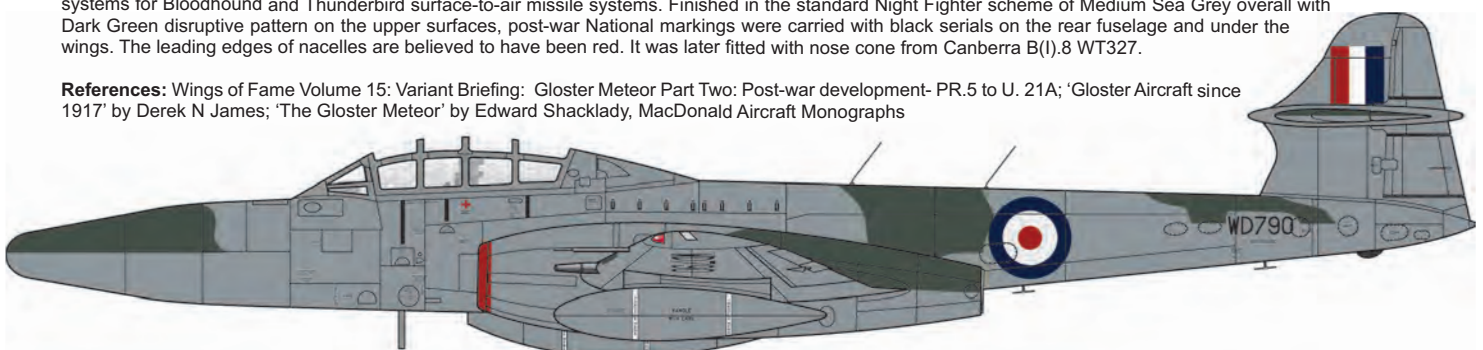
References: Air Britain Photo Archives; 'The Gloster Meteor' by Edward Shacklady, MacDonald Aircraft Monographs



Armstrong Whitworth Meteor NF.11, WD790, (upgraded to NF.12 standard), Ferranti Flying Unit, Turnhouse, 1958

At this time, WD790 was involved in development of the AI Mk 23 AIRPASS radar as used in the English Electric Lightning, and also Red Brick/Indigo Corkscrew radar systems for Bloodhound and Thunderbird surface-to-air missile systems. Finished in the standard Night Fighter scheme of Medium Sea Grey overall with Dark Green disruptive pattern on the upper surfaces, post-war National markings were carried with black serials on the rear fuselage and under the wings. The leading edges of nacelles are believed to have been red. It was later fitted with nose cone from Canberra B(I).8 WT327.

References: Wings of Fame Volume 15: Variant Briefing: Gloster Meteor Part Two: Post-war development- PR.5 to U. 21A; 'Gloster Aircraft since 1917' by Derek N James; 'The Gloster Meteor' by Edward Shacklady, MacDonald Aircraft Monographs

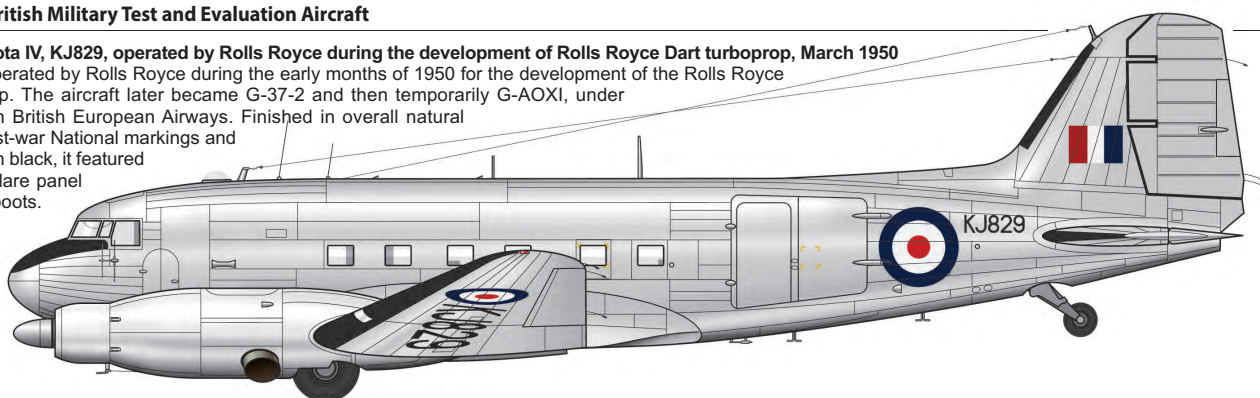


Douglas Dakota IV, KJ829, operated by Rolls Royce during the development of Rolls Royce Dart turboprop, March 1950

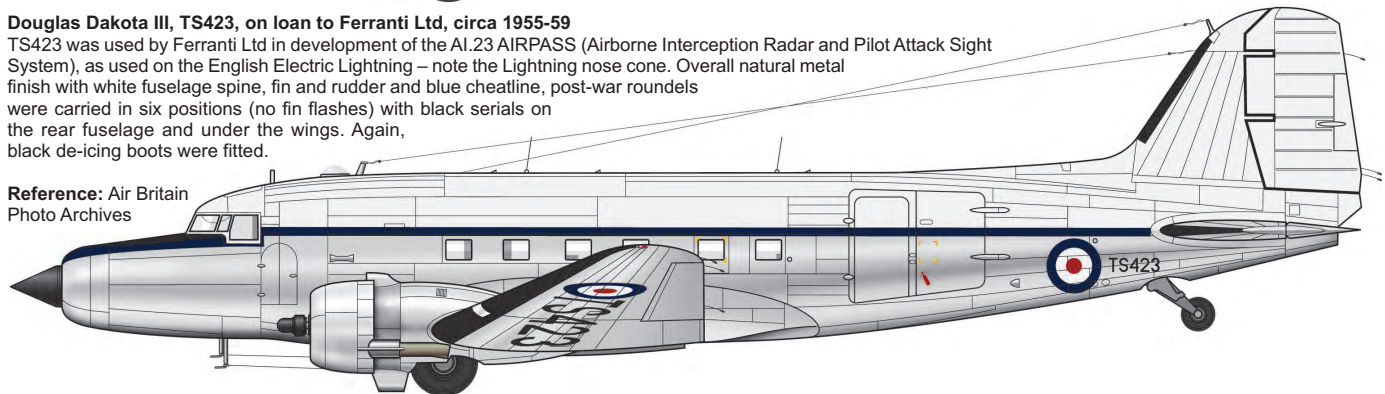
KJ829 was operated by Rolls Royce during the early months of 1950 for the development of the Rolls Royce Dart turboprop. The aircraft later became G-37-2 and then temporarily G-AOXI, under operation with British European Airways. Finished in overall natural metal with post-war National markings and black serials in black, it featured a black anti-glare panel and de-icing boots.

Reference:

Airfix Magazine
November 1980

**Douglas Dakota III, TS423, on loan to Ferranti Ltd, circa 1955-59**

TS423 was used by Ferranti Ltd in development of the AI.23 AIRPASS (Airborne Interception Radar and Pilot Attack Sight System), as used on the English Electric Lightning – note the Lightning nose cone. Overall natural metal finish with white fuselage spine, fin and rudder and blue cheatline, post-war roundels were carried in six positions (no fin flashes) with black serials on the rear fuselage and under the wings. Again, black de-icing boots were fitted.

Reference: Air Britain Photo Archives

Above left: Douglas Dakota 4, KJ839, in use as an Armstrong Siddeley Mamba turboprop test bed. KJ839 was acquired for use by the company on 1 June 1949 and continued to serve in the role until at least June 1954 when this photo was taken. KJ839 should not be confused with Dakota 4, KJ829, (see illustration above), which was used in the development of the Roll-Royce Dart engine.

Above: A close-up of KJ839's Mamba engine test bed installation.



Left: English Electric Canberra PR.3, VX181, seen at Finningley in September 1965. First flown in March 1951, this Canberra spent its entire active career as a test aircraft, principally with the A&AEE, the motif of which is displayed on the fin. VX181 last flew in June 1969 when it was flown to RAF Pershore, Worcestershire, for use as a ground training machine and was subsequently scrapped. Apart from its impressive colour scheme, the white lettering on the side of the nose is believed to have commemorated the two record flights set by this aircraft in January 1953 when it flew from London to Darwin in 22 hours and 21 seconds, completing en route a record time to Karachi of 8 hours 52 minutes and 28 seconds!

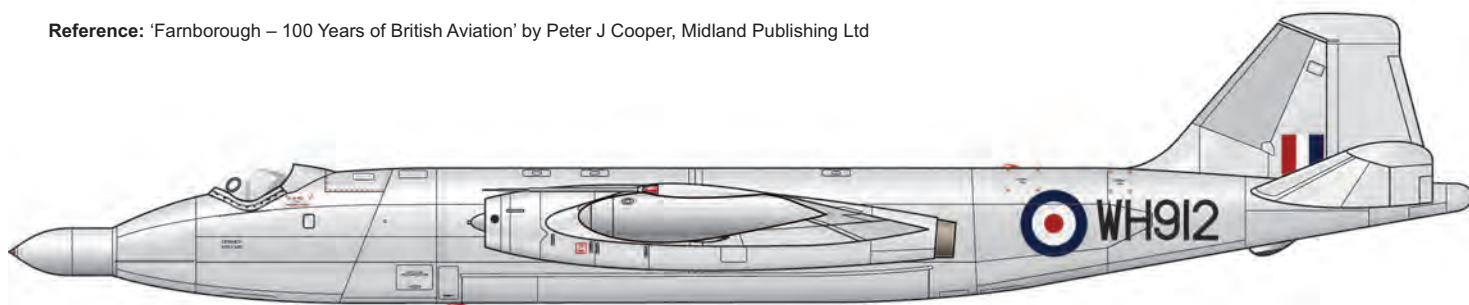


Bottom left: English Electric Canberra U.10 target drone, WJ987, was converted from a B.2 by Short Brothers & Harland in 1957, and is seen here in 1958 displaying black and white calibration bands. U.10s were operated by remote control from the ground via a VHF radio link, although the cockpit was occupied. WJ987 was used in trials of guided surface-to-air and air-to-air missile systems for which it acted as a target. On 5 March 1959, this aircraft was handed over to the Royal Australian Air Force. (see third illustration from the top, opposite)

English Electric Canberra B.2, WH912, Armament Flight, Royal Aircraft Establishment, Farnborough, October 1955

This aircraft was used for research into VT bomb fuses and featured a modified nose with extended cone. Finished in the overall High Speed Silver scheme with black serials, WH912 suffered a wheels-up landing on 23 November 1959. After repair it was sent to Hunting Engineering, Luton on 1 December 1960.

Reference: 'Farnborough – 100 Years of British Aviation' by Peter J Cooper, Midland Publishing Ltd

**English Electric Canberra B.2, WJ582, Meteorological Research Flight, Royal Aircraft Establishment, Farnborough, September 1956**

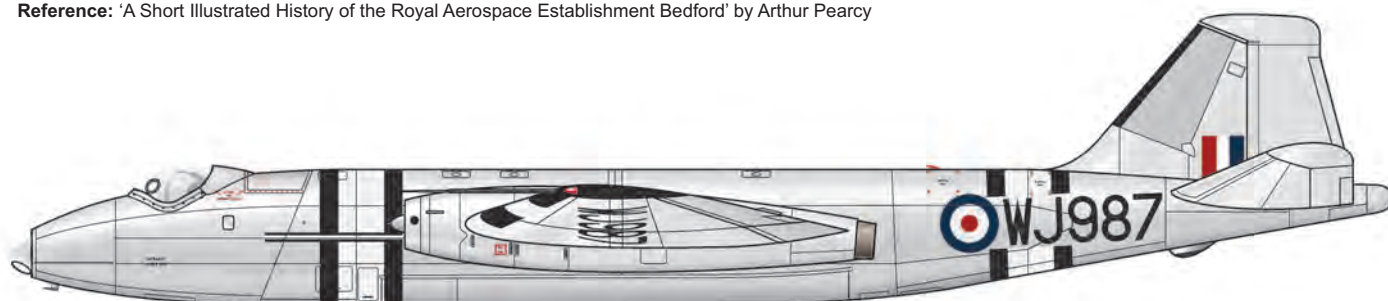
WJ582 took part in various high-altitude research tasks, including radioactive particle sampling from US and Soviet nuclear tests and ozone sampling. It is thought to have been finished in PRU Blue overall rather than the High Altitude Photo Reconnaissance Scheme of PRU Blue and Medium Sea Grey, as a definite colour demarcation line cannot be seen on the upper fuselage or engine nacelle on the reference photos. Fuselage and underwing serials are white. An RAE crest appears to have been carried on the nose – see inset. WJ582 crashed, hitting the sea on approach to RAF Leuchars, on return from a stratospheric test mission over the Arctic on 20 February 1962.

Reference: 'Farnborough – 100 Years of British Aviation' by Peter J Cooper, Midland Publishing Ltd

**English Electric Canberra U.10, WJ987, Royal Aircraft Establishment, Bedford, 1958**

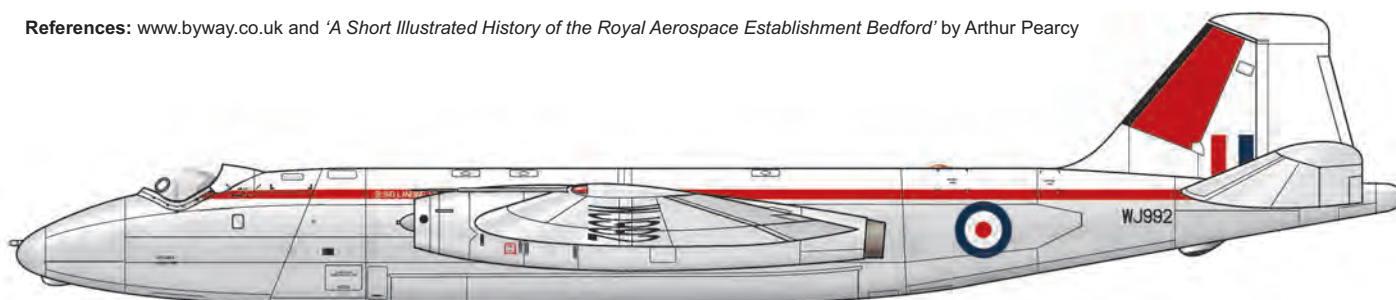
WJ987 was converted from a B.2 by Short Brothers & Harland and originally served with 76 Squadron. Finished in overall High Speed Silver with black serials, it had black and white band calibration markings around the front and the rear fuselage, and black and white wing leading edges and tips. As a U.10, WJ987 was operated under remote control from ground by VHF radio link, although cockpit was occupied. It was also used in trials of guided surface-to-air and air-to-air missile systems, whereby it would act as a target, and would track incoming missiles; recording and transmitting back to the ground data of flight characteristics and miss distance.

Reference: 'A Short Illustrated History of the Royal Aerospace Establishment Bedford' by Arthur Percy

**English Electric Canberra T.4, WJ992, Blind Landing Experimental Unit, RAE Bedford, October 1958**

WJ992 originally started life as a B.2 and was converted to T.4 specification, being transferred to the RAE at Pershore in September 1962. Finished in overall High Speed Silver, with white fuselage upper decking, it is thought that the cheatline was red, (as illustrated), but it might possibly have been blue. Note fairings on nose area housing blind landing equipment.

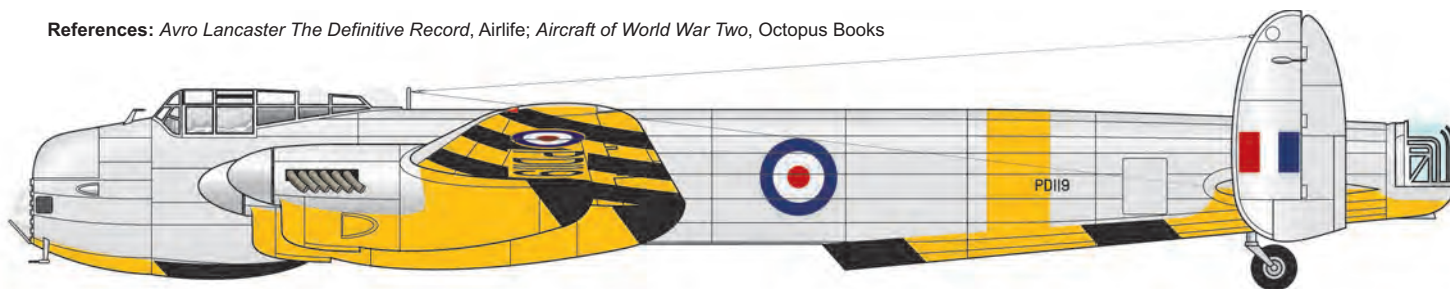
References: www.byway.co.uk and 'A Short Illustrated History of the Royal Aerospace Establishment Bedford' by Arthur Percy



Avro Lancaster B.I (Special), PD119, Royal Aircraft Establishment. Shoeburyness, May 1951

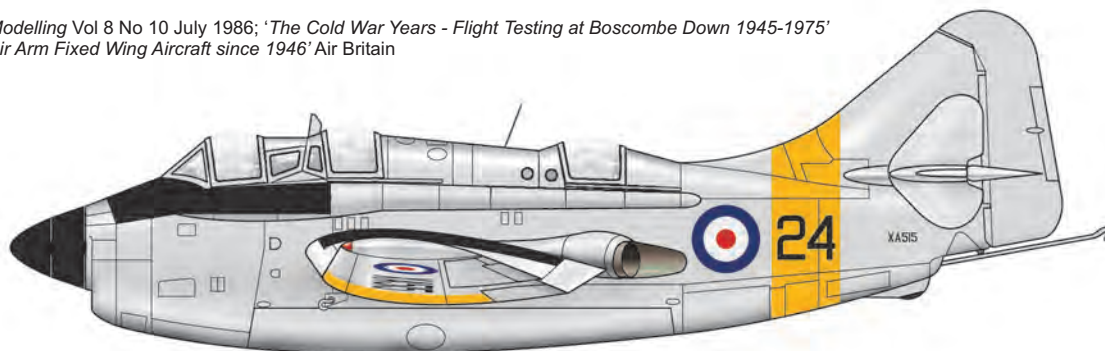
PD119 was flown by the Royal Aircraft Establishment from 1951 on research duties. The aircraft formally served with Nos 617 (the famed 'Dambuster' unit), 156 and 15 Squadrons before being passed over to the RAE. Its fate is unknown. Finish was overall painted Aluminium/High Speed Silver to Pattern No 1 with yellow and black diagonal bands on the under surfaces and post-war National Markings. Serial number was black.

References: *Avro Lancaster The Definitive Record*, AirLife; *Aircraft of World War Two*, Octopus Books

**Fairey Gannet T.Mk.2, XA515/24, Empire Test Pilots School, RAE Farnborough, late 1955**

XA515 was delivered to RAE Farnborough in November 1955, after previously serving with Fairey Aviation at White Waltham and then the A&AEE at Boscombe Down. During service with these former two operators, it was used in trials of the GGS Mk.4 gunsight. After delivery to Farnborough, it acquired its '24' numeral coding, and served until September 1960 when it was used for fire fighting practice. The aircraft was scrapped in 1962. Finish was overall Aluminium with Yellow 'Trainer' bands around the wings and rear fuselage. The walkways, anti-glare panel and spinner were in black.

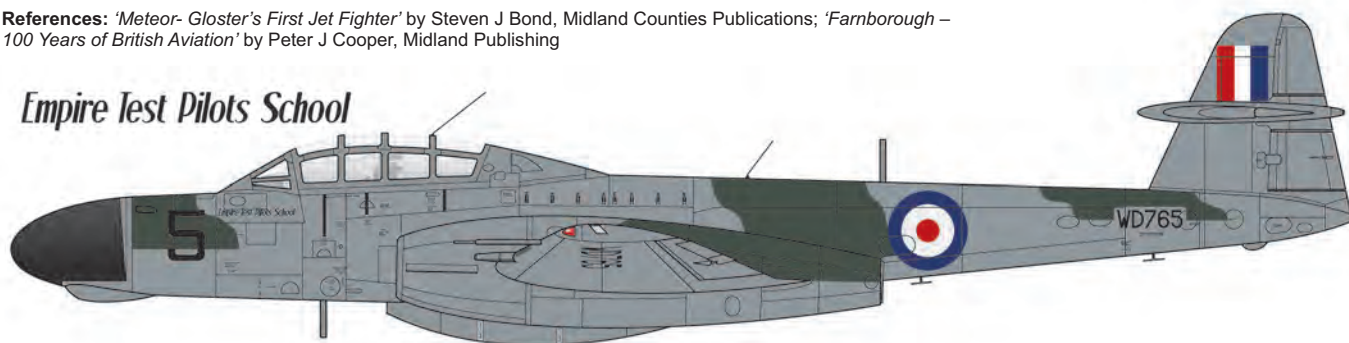
Reference: *Scale Aircraft Modelling Vol 8 No 10 July 1986*; 'The Cold War Years - Flight Testing at Boscombe Down 1945-1975' Hikoki Publications; 'Fleet Air Arm Fixed Wing Aircraft since 1946' Air Britain

**Armstrong Whitworth Meteor NF.11, WD765/5, Empire Test Pilots School, Farnborough, mid-1957**

WD765 arrived at the ETPS in February 1957, having come from 29 MU although it may have served with 228 OCU previously, and was one of a number of NF.11s operated by the ETPS. Finished in the standard Night Fighter scheme of Medium Sea Grey overall with Dark Green disruptive pattern on the upper surfaces, it had post-war national markings and black serials and nose code '5'. 'Empire Test Pilots School' titles were also painted on nose in black. Of note is the angled edge to the radome. Unfortunately, WD765 crashed at Mapledurwell, Basingstoke on 20 October 1958 when the fuselage broke up and it was Struck Off Charge in December 1958.

References: 'Meteor- Gloster's First Jet Fighter' by Steven J Bond, Midland Counties Publications; 'Farnborough – 100 Years of British Aviation' by Peter J Cooper, Midland Publishing

Empire Test Pilots School

**Westland Dragonfly HR.1, VX595/29, Empire Test Pilots School, RAE Farnborough, 1958**

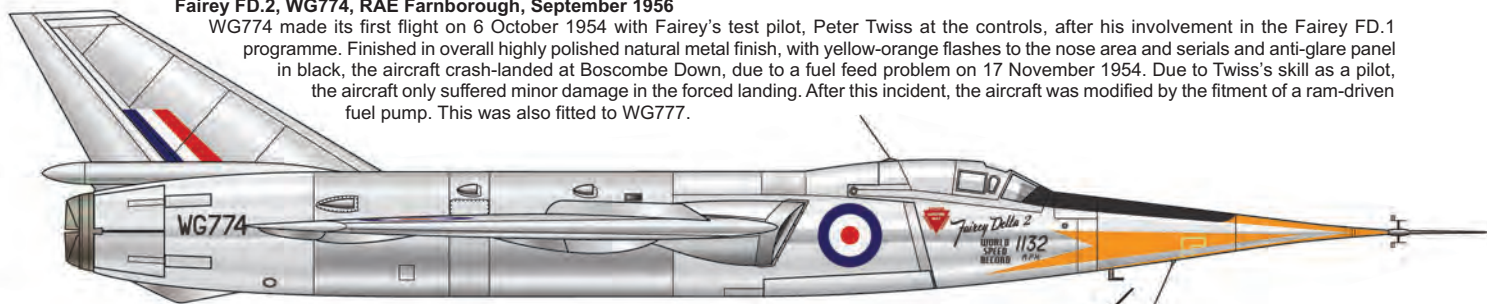
VX595 was the first Dragonfly production prototype, and was delivered to Farnborough in September 1957. Finished in Extra Dark Sea Grey upper surfaces to Pattern No 2 with remainder of the fuselage in Sky, it carried the ETPS crest on cabin door. Serials and code '29' were in black. VX595 was struck off charge in October 1964, and remains in storage at the Fleet Air Arm Museum at Yeovilton.

Reference: 'Farnborough – 100 Years of British Aviation' by Peter J Cooper, Midland Publishing



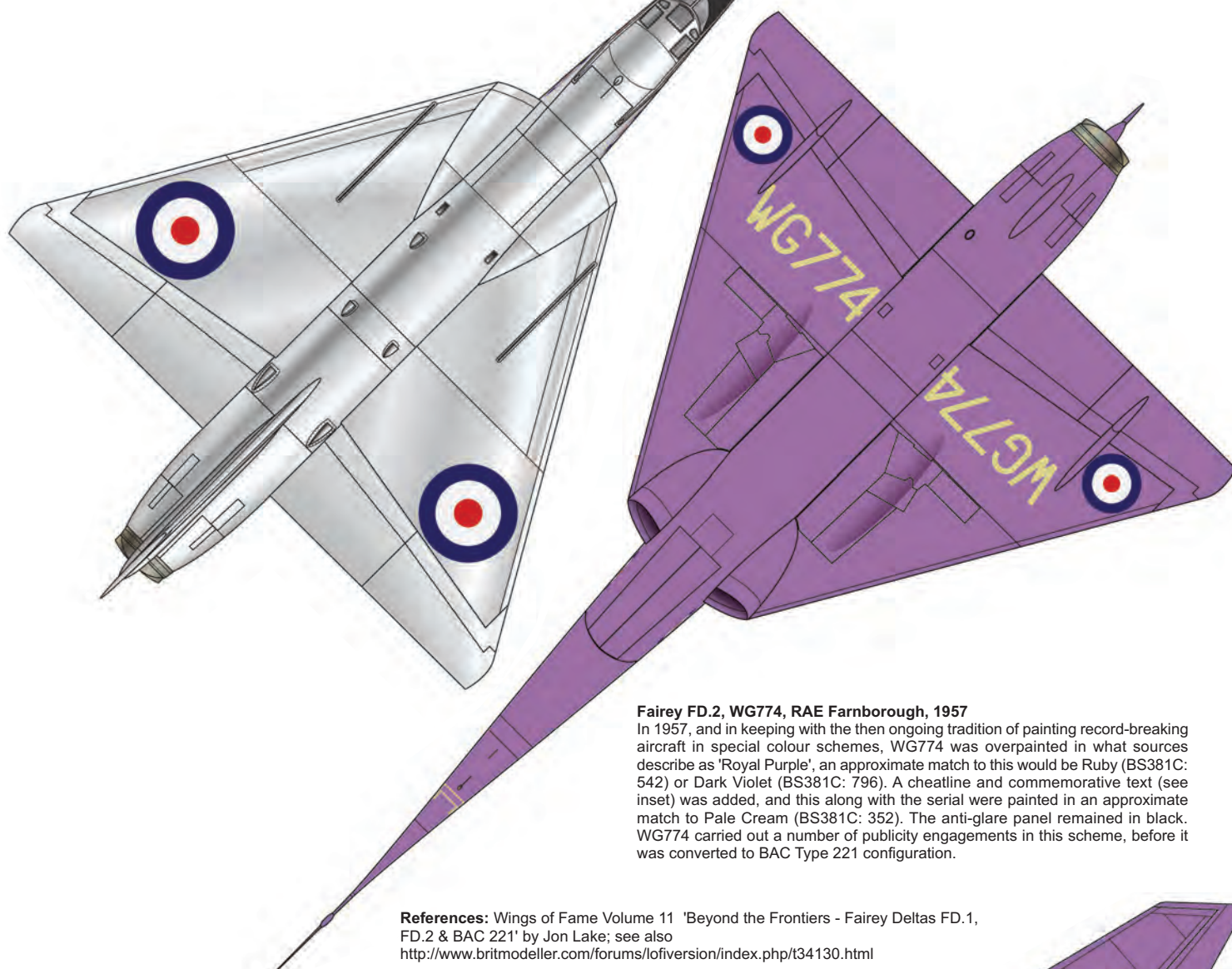
Fairey FD.2, WG774, RAE Farnborough, September 1956

WG774 made its first flight on 6 October 1954 with Fairey's test pilot, Peter Twiss at the controls, after his involvement in the Fairey FD.1 programme. Finished in overall highly polished natural metal finish, with yellow-orange flashes to the nose area and serials and anti-glare panel in black, the aircraft crash-landed at Boscombe Down, due to a fuel feed problem on 17 November 1954. Due to Twiss's skill as a pilot, the aircraft only suffered minor damage in the forced landing. After this incident, the aircraft was modified by the fitment of a ram-driven fuel pump. This was also fitted to WG777.



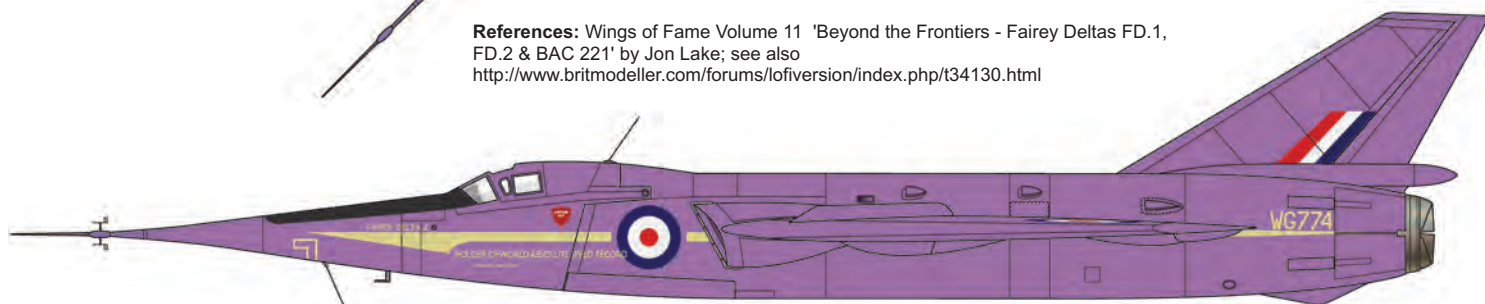
The black nose titles were applied for publicity purposes after Twiss broke the World Absolute Speed Record on 10 March 1956, reaching an average speed of 1,132.136mph. WG774 therefore became the first aircraft in the world to exceed 1,000mph in level flight. Twiss made several practice runs at around 38,000ft from 8 March of that year. The aircraft topped-out at 1,117.6mph on its first run, and 1,146.9mph on its second run. Only lack of internal fuel (due to lack of internal space) prevented Twiss from pushing the aircraft to a higher speed. This broke the previously-held record of 822.26mph set by USAF Colonel Horace Haynes in a North American F-100C Super Sabre on 20 August 1955. The FD.2's record was broken on 12 December 1957 by a USAF F-101A Voodoo. WG774 appeared in this scheme at the 1956 SBAC show at Farnborough, piloted by Peter Twiss, flying alongside FD.2 WG777.

Fairey Delta 2
WORLD
SPEED
RECORD 1132
M.P.H.

**Fairey FD.2, WG774, RAE Farnborough, 1957**

In 1957, and in keeping with the then ongoing tradition of painting record-breaking aircraft in special colour schemes, WG774 was overpainted in what sources describe as 'Royal Purple', an approximate match to this would be Ruby (BS381C: 542) or Dark Violet (BS381C: 796). A cheatline and commemorative text (see inset) was added, and this along with the serial were painted in an approximate match to Pale Cream (BS381C: 352). The anti-glare panel remained in black. WG774 carried out a number of publicity engagements in this scheme, before it was converted to BAC Type 221 configuration.

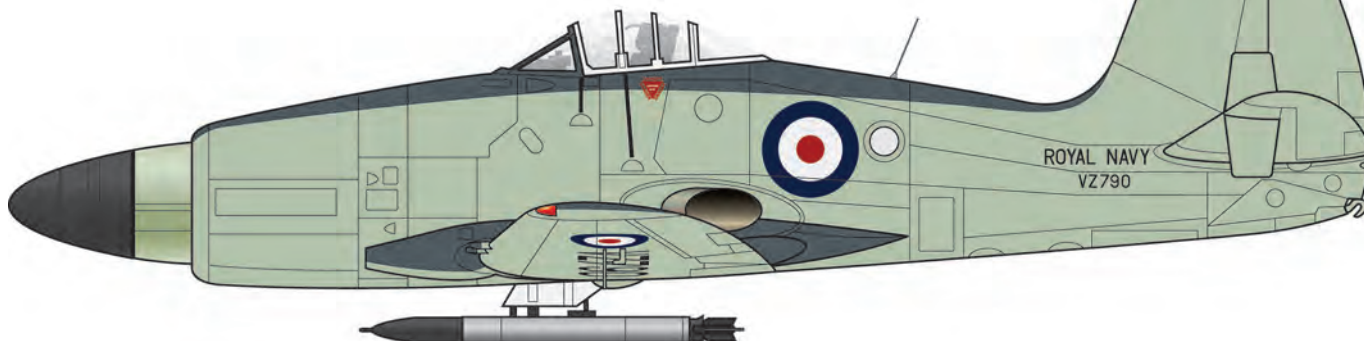
References: Wings of Fame Volume 11 'Beyond the Frontiers - Fairey Deltas FD.1, FD.2 & BAC 221' by Jon Lake; see also <http://www.britmodeller.com/forums/lofiversion/index.php/t34130.html>



Westland Wyvern S.4, VZ790, A&AEE Boscombe Down, during 'Red Angel' rocket trials, July 1954

'Red Angel' was the code name given to the warhead that was intended to be used on the cancelled Armstrong Whitworth 'Blue Slug' anti-shiping missile; itself an offshoot of the Sea Slug surface-to-air missile. Wyvern S.4, VZ790, was modified by Westlands in May 1954 for the carriage of two of these weapons, before being passed on to the A&AEE at Boscombe Down in July of the same year, where it undertook handling and flight limitations trials. The aircraft was then passed on for holding before being issued to No.827 Squadron at RNAS Ford. Finish was standard Fleet Air Arm Extra Dark Sea Grey upper surfaces to Pattern No 2 with Sky under surfaces and post-war National Markings.

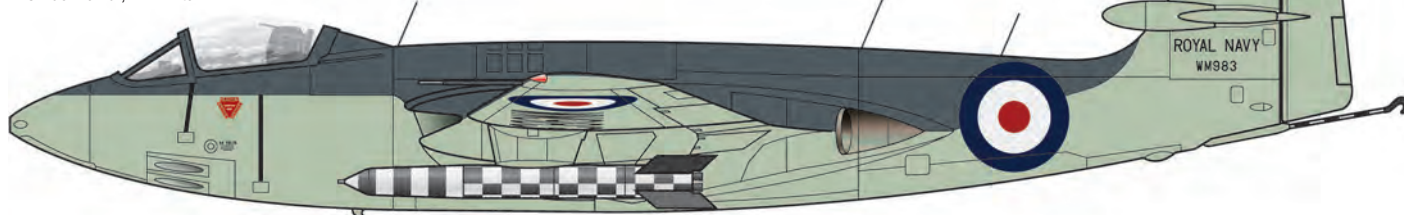
References: *Scale Aircraft Modelling* Vol 14 No 2 November 1991; 'The Cold War Years – Flight Testing at Boscombe Down 1945-1975' Hikoki Publications; 'Fleet Air Arm Fixed Wing Aircraft since 1946' Air Britain



Hawker Sea Hawk FB.3, WM983, 1,000lb air-to-surface rocket tests, A&AEE Boscombe Down, May 1955

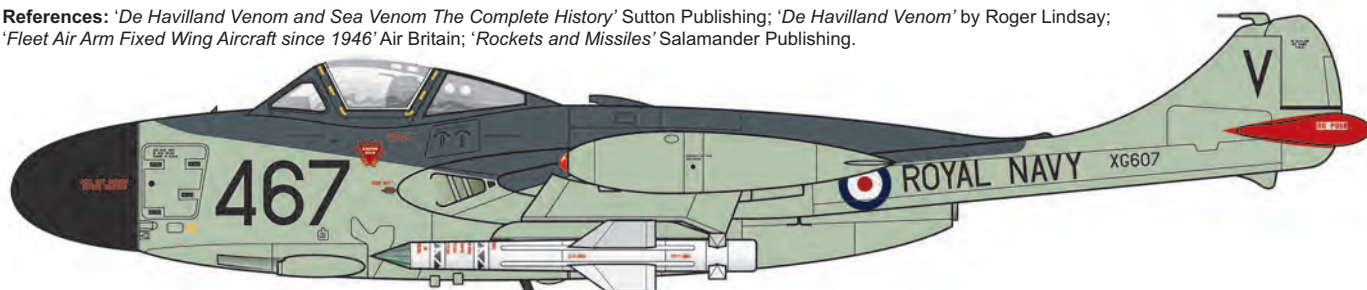
Initially delivered to 'C' Squadron at A&AEE Boscombe Down in June 1954, Sea Hawk WM983 is shown as it appeared during rocket handling tests in mid-1955. Two of these formidable 1,000lb weapons could be carried, and just about approached the aircraft's load-carrying limit. WM983 spent around a year with the A&AEE before being passed on to 811 Naval Air Squadron at RNAS Ford. The black and white checkerboard markings on the missiles were for photographic calibration purposes. Finish was standard FAA Extra Dark Sea Grey upper surfaces to Pattern No 2 with Sky undersides, post-war National Markings and black serials.

Reference: *The Cold War Years – Flight Testing at Boscombe Down 1945-1975*, Hikoki Publications; 'Fleet Air Arm Fixed Wing Aircraft since 1946', Air Britain



De Havilland Sea Venom FAW.21, XG607/467, 893 Naval Air Squadron during 'Project Blue Jay' air-to-air missile trials aboard HMS Victorious, January 1959
Initially codenamed Blue Jay, the de Havilland Firestreak was Great Britain's first fully operational air-to-air missile. Sea Venom XG607 was one of three aircraft modified in 1957 at de Havilland Christchurch to carry Blue Jay, the others being XG612 and XG662. All guns were removed, and the gun camera was moved to a new position in the port outer cannon bay. Flight trials with dummy rounds began with 700 NAS at RNAS Ford, in the summer of 1958, XG607 being coded '522'. The three aircraft were then passed to 893 NAS for operational service trials of the missile in 1958, aboard the carrier HMS Victorious. 893 NAS would become the only unit to operate Firestreak equipped Sea Venoms in the Royal Navy. XG607 was finally 'Struck Off Charge' in December 1962. Finish was standard Extra Dark Sea Grey upper surfaces with Sky undersides. It is believed that the tail cone acorns were red.

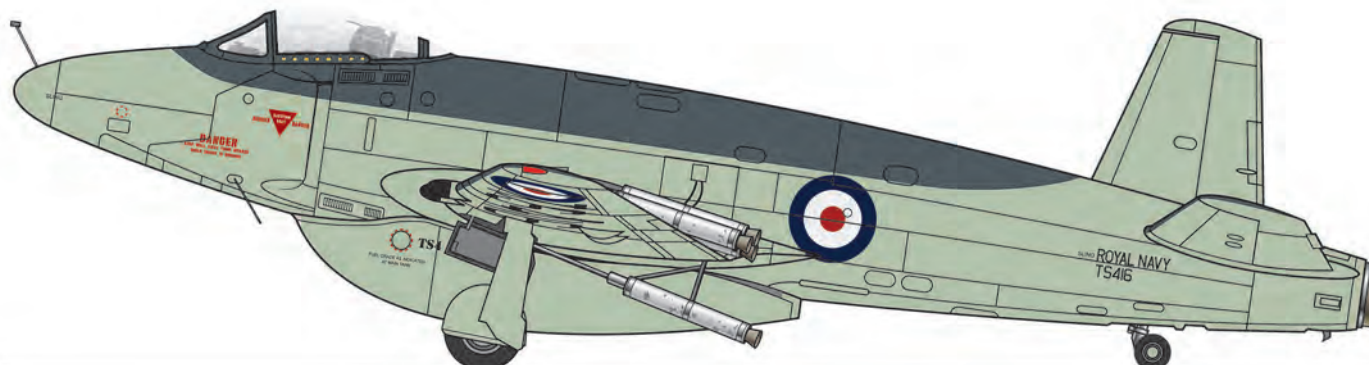
References: 'De Havilland Venom and Sea Venom The Complete History' Sutton Publishing; 'De Havilland Venom' by Roger Lindsay; 'Fleet Air Arm Fixed Wing Aircraft since 1946' Air Britain; 'Rockets and Missiles' Salamander Publishing.



Supermarine E.10/44 Attacker, TS416, Royal Aircraft Establishment, Farnborough, September 1950

TS416 was the third Attacker prototype, and arrived at Farnborough on 27 May 1950. It was used by the RAE Naval Air Department, principally as an arrester trials aircraft, and was, from 5 May 1950, fitted with Rocket Assisted Take Off Gear (RATOG). Finished in the standard FAA Extra Dark Sea Grey upper surfaces with Sky undersides to Pattern No 2, with post-war Red/White/Blue roundels and black 'ROYAL NAVY' titles and serials, TS416 was latterly involved in jet deflection trials and served at Farnborough until 12 August 1954, when it was sent to St Merryn for use as a ground instructional airframe.

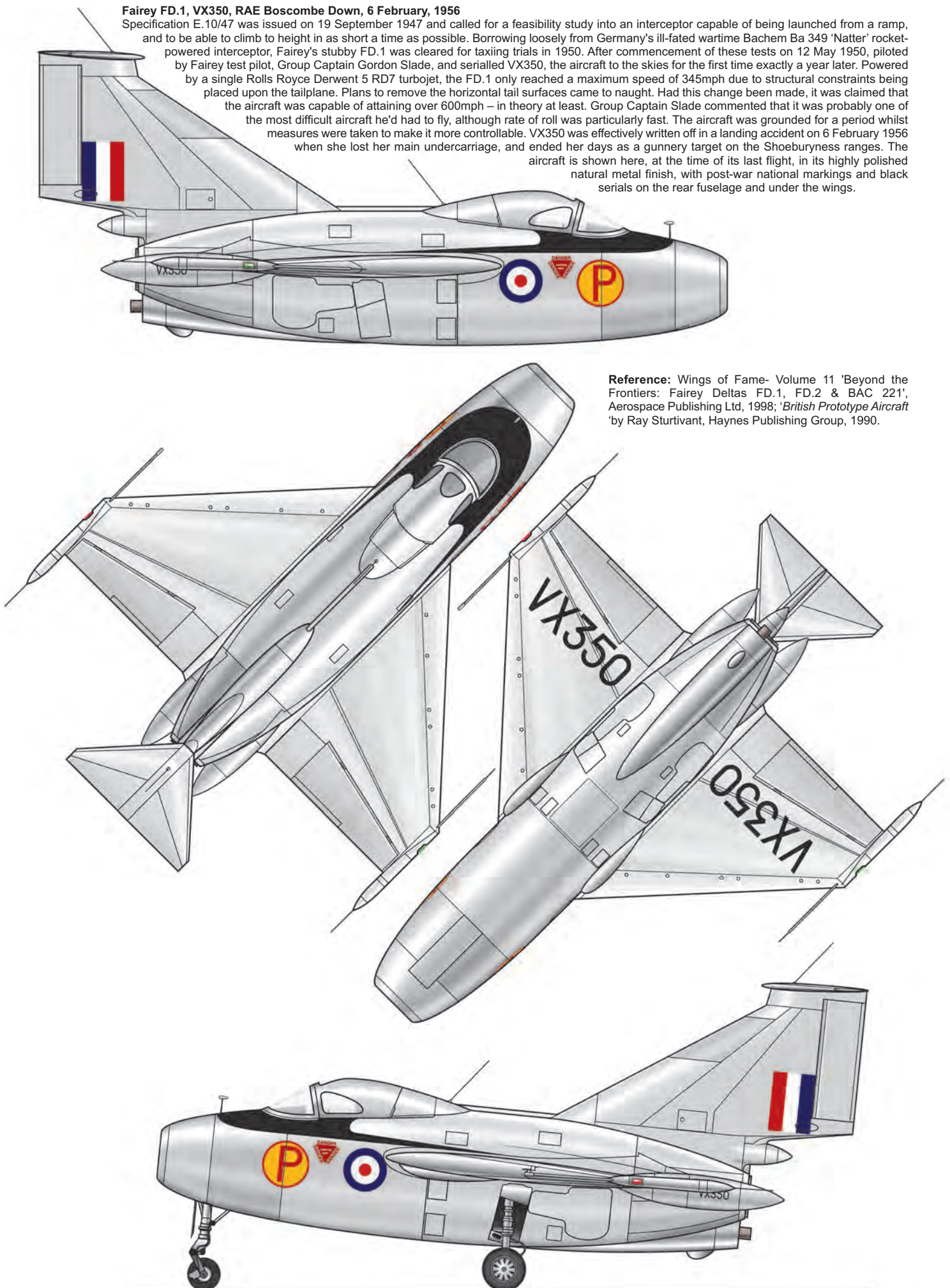
Reference: 'Farnborough – 100 Years of British Aviation' by Peter J Cooper, Midland Publishing Ltd



Fairey FD.1, VX350, RAE Boscombe Down, 6 February, 1956

Specification E.10/47 was issued on 19 September 1947 and called for a feasibility study into an interceptor capable of being launched from a ramp, and to be able to climb to height in as short a time as possible. Borrowing loosely from Germany's ill-fated wartime Bachem Ba 349 'Natter' rocket-powered interceptor, Fairey's stubby FD.1 was cleared for taxiing trials in 1950. After commencement of these tests on 12 May 1950, piloted by Fairey test pilot, Group Captain Gordon Slade, and serialised VX350, the aircraft to the skies for the first time exactly a year later. Powered by a single Rolls Royce Derwent 5 RD7 turbojet, the FD.1 only reached a maximum speed of 345mph due to structural constraints being placed upon the tailplane. Plans to remove the horizontal tail surfaces came to naught. Had this change been made, it was claimed that the aircraft was capable of attaining over 600mph – in theory at least. Group Captain Slade commented that it was probably one of the most difficult aircraft he'd had to fly, although rate of roll was particularly fast. The aircraft was grounded for a period whilst measures were taken to make it more controllable. VX350 was effectively written off in a landing accident on 6 February 1956 when she lost her main undercarriage, and ended her days as a gunnery target on the Shoeburyness ranges. The aircraft is shown here, at the time of its last flight, in its highly polished natural metal finish, with post-war national markings and black serials on the rear fuselage and under the wings.

Reference: Wings of Fame- Volume 11 'Beyond the Frontiers: Fairey Deltas FD.1, FD.2 & BAC 221', Aerospace Publishing Ltd, 1998; 'British Prototype Aircraft' by Ray Sturtivant, Haynes Publishing Group, 1990.



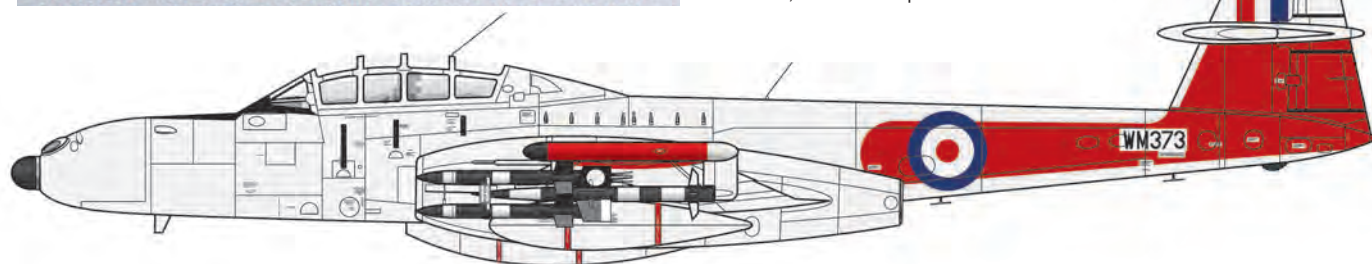


Above and left: Hawker Hunter F.6, WW598, first flew at the end of 1955 and was never allocated to the RAF. It later joined the 'Aero Flight' at RAE Bedford having at some point received the overall blue colour scheme seen here. Later, WW598 would participate in the TSR2 programme (for which it was painted white) and was ultimately operated by the RAE at Llanbedr. In May 1974, it was sold to Hawker Siddeley, refurbished, and later delivered to the Lebanese Air Force. The words AERO FLIGHT appear in white on the aircraft's nose, below which, within the white cheat line, the words RAE BEDFORD have been applied in red. (see illustration opposite)

Armstrong Whitworth Meteor NF.11, WM373, Fairey Guided Weapons Division, Fairey Aviation Ltd, early/mid-1950s

WM373 was used by Fairey in the development of the Fireflash (Blue Sky) air-to-air missile system and is shown carrying one of these weapons on each wingtip – (AW Meteor NF.11 WM374 was also used in the same programme). Painted in an overall gloss white scheme with Post Office Red (BS381C: 537) fuselage and fin trim, standard post-war national markings were carried with black serials and anti-glare panel. The modified nose housed a camera and measuring equipment. WM373 went on to serve with the Royal Radar Establishment (RRE) before being sent to Woomera, Australia on 13 April 1955.

References: 'The Gloster Meteor' by Edward Shacklady, MacDonald Aircraft Monographs; *Gloster Aircraft since 1917* by Derek N James, Putnam's; 'Trials & Testbed Meteors' by Barry Jones; Australian War Memorial photo; 'Missile Age Meteors'; Mark Rolfe's personal archives



Avro Lincoln B.2, RF533, RAE Farnborough, April 1955

RF533 was one of the more famous of the test Lincolns, being sent to Telecommunications Flying Unit (TFU) Defford in 1948 as a radar test aircraft. A number of air-intercept radar units were fitted into the specially modified nose. Finished in the standard post-war Bomber Scheme of Medium Sea Grey upper surfaces to Pattern No 2 with Anti-Searchlight Glossy Black under surfaces, fuselage serials were in red, while the underwing serials were white. The nose cone was red and yellow. RF533 also undertook various engine trials including tests of the Napier Naiad and Rolls Royce Tyne turboprop; the aircraft being able to fly on the power of this single engine alone. This profile depicts RF533 as it looked while undergoing missile/turbojet development work.

Reference: 'Farnborough – 100 Years of British Aviation' by Peter J Cooper, Midland Publishing Ltd



Hawker Hunter F.6, WW598, (converted to P.1109A configuration), Aero Flight Systems, RAE Bedford, circa mid-late 1950s

WW598 first flew on 31 December 1955 and was used for various trials at Dunsfold before being passed onto RAE Farnborough, and then to RAE Bedford (High Speed Flight), where it was converted to P.1109A configuration and used for de Havilland Firestreak air-to-air missile system tests. WW598 was finished in overall Roundel Blue (BS381C:110) with cheatline, serials and 'AERO FLIGHT' titles in white. (see also pp46 and 58)

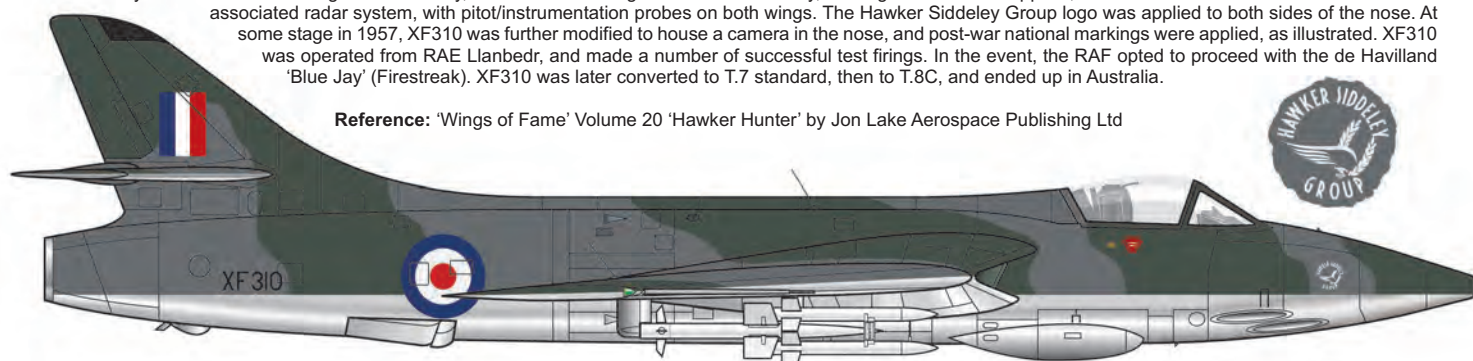
Reference: 'A Short Illustrated History of the Royal Aerospace Establishment Bedford' by Arthur Percy, Airfile; plus online discussion groups



Hawker Hunter F.4, XF310, Hawker Aircraft Company, RAE Llanbedr, circa 1957

XF310 was originally modified by Fairey Aviation Ltd to test the Fairey 'Blue Sky' (Fireflash) air-to-air missile system, two of which were carried. Finished in the standard RAF Day Fighter scheme of gloss Dark Green and Dark Sea Grey upper surfaces with what appears to be Aluminium/High Speed Silver undersides (as illustrated), but may have been white or Light Aircraft Grey, no national markings were carried initially, although serials were applied, in the standard black. The nose carried the associated radar system, with pitot/instrumentation probes on both wings. The Hawker Siddeley Group logo was applied to both sides of the nose. At some stage in 1957, XF310 was further modified to house a camera in the nose, and post-war national markings were applied, as illustrated. XF310 was operated from RAE Llanbedr, and made a number of successful test firings. In the event, the RAF opted to proceed with the de Havilland 'Blue Jay' (Firestreak). XF310 was later converted to T.7 standard, then to T.8C, and ended up in Australia.

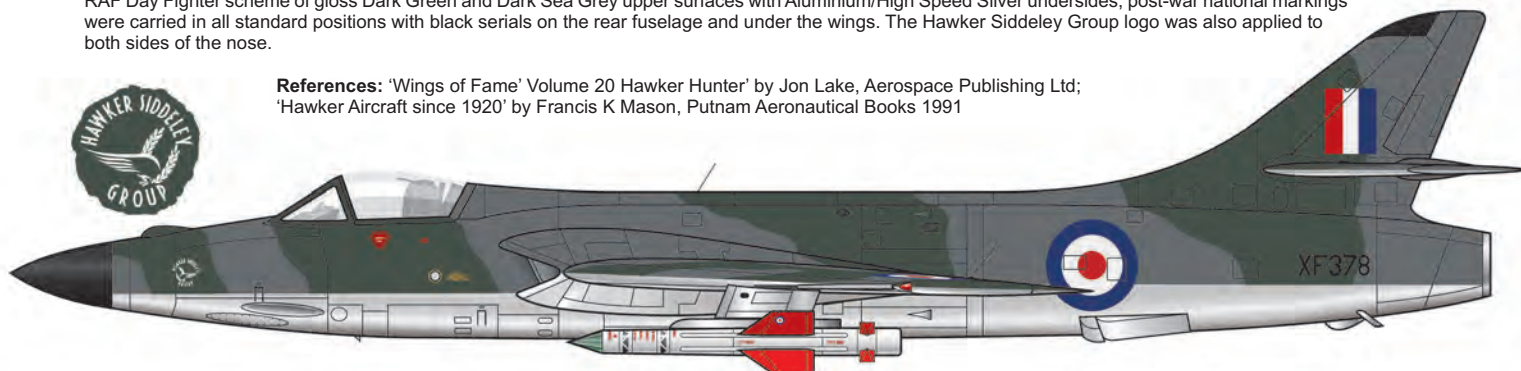
Reference: 'Wings of Fame' Volume 20 'Hawker Hunter' by Jon Lake Aerospace Publishing Ltd



Hawker Hunter F.6 (P.1109B), XF378, de Havilland Aircraft Company/Hawker Aircraft Company, RAE Llanbedr, 1957

XF378 carried the full AI Mk 20 radar/Blue Jay (Firestreak) kit in a modified nose fairing, and was active over the Aberporth ranges during 1957. It was based at RAE Llanbedr at the time and carried two Blue Jays, the colouring for which appears to have been white with red fins, which also carried RAF roundels. Finished in the standard RAF Day Fighter scheme of gloss Dark Green and Dark Sea Grey upper surfaces with Aluminium/High Speed Silver undersides, post-war national markings were carried in all standard positions with black serials on the rear fuselage and under the wings. The Hawker Siddeley Group logo was also applied to both sides of the nose.

References: 'Wings of Fame' Volume 20 Hawker Hunter' by Jon Lake, Aerospace Publishing Ltd;
'Hawker Aircraft since 1920' by Francis K Mason, Putnam Aeronautical Books 1991



Supermarine Swift FR.7, XF119, No 1 Guided Weapons Missile Development Squadron, RAF Valley, circa 1958

XF119 was one of the twelve first production batch Swift FR.7s, and No 1 Guided Weapons Development Squadron, based at RAF Valley operated ten of these aircraft – serials XF115 to XF124. XF119 is illustrated here carrying two Fairey 'Blue Sky' (Fireflash) beam-riding, air-to-air missiles. Finished in the standard RAF Day Fighter scheme of gloss Dark Green/Dark Sea Grey upper surfaces and Aluminium/High Speed Silver undersides with post-war national markings and black serials, the Swifts operated by this unit were the first fighters in UK service to carry guided missiles operationally. XF119 ended its days at 23 Maintenance Unit, Aldergrove, before being sold as scrap in February 1960.

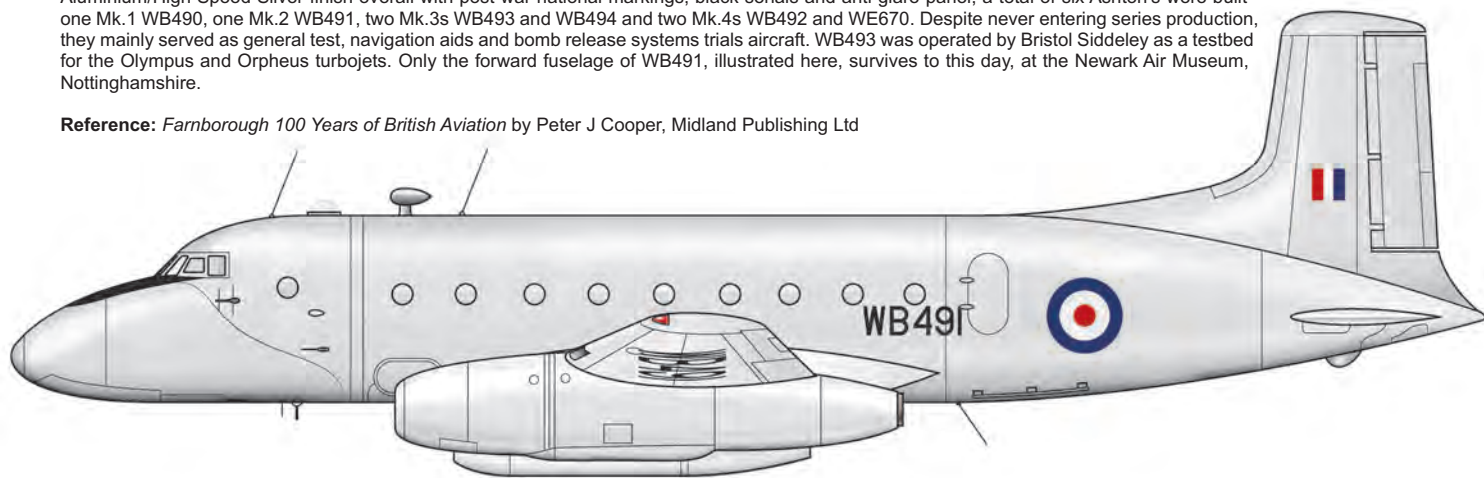
Reference: Post War Military Aircraft No 7 'Supermarine Attacker, Swift and Scimitar' by Philip Birtles, Ian Allan



Avro Ashton Mk.2, WB491, National Gas Turbine Establishment Pyestock, Fleet, Hampshire, 1956

The National Gas Turbine Establishment (NGTE) was established in 1946 from the merger of Power Jets Ltd and the Royal Aircraft Establishment's own jet turbine research institution. Based on the Avro Tudor piston airliner, the Avro Ashton Mk.1, WB490, first flew on 1 September 1950. The Mk.2, WB491, arrived at Farnborough on 4 September 1955 and undertook various turbine trials, including the Rolls Royce Avon and Conway, housed in a fairing underneath the fuselage. Painted Aluminium/High Speed Silver finish overall with post-war national markings, black serials and anti-glare panel, a total of six Ashton's were built – one Mk.1 WB490, one Mk.2 WB491, two Mk.3s WB493 and WB494 and two Mk.4s WB492 and WE670. Despite never entering series production, they mainly served as general test, navigation aids and bomb release systems trials aircraft. WB493 was operated by Bristol Siddeley as a testbed for the Olympus and Orpheus turbojets. Only the forward fuselage of WB491, illustrated here, survives to this day, at the Newark Air Museum, Nottinghamshire.

Reference: *Farnborough 100 Years of British Aviation* by Peter J Cooper, Midland Publishing Ltd

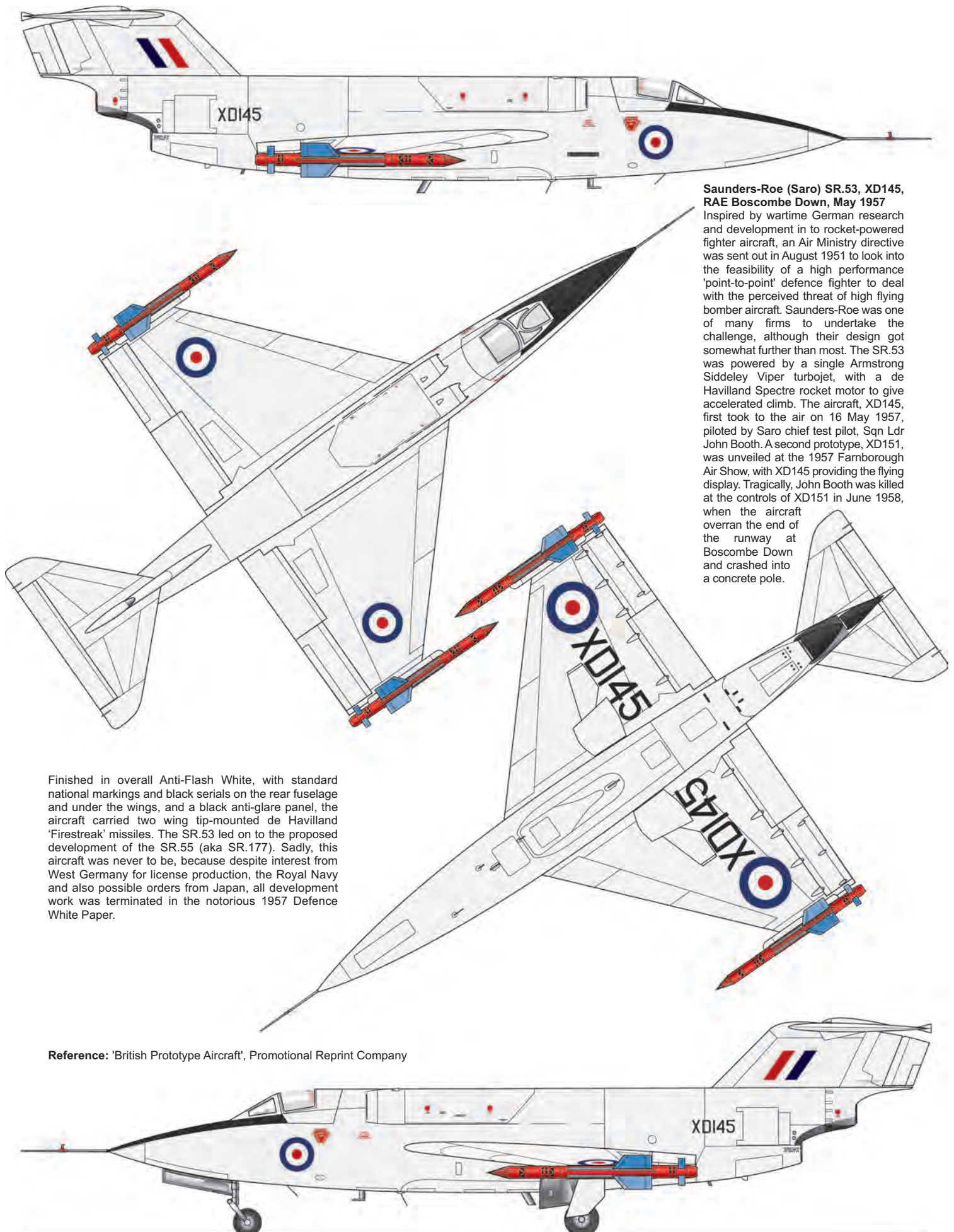


Left: Based on the Avro Tudor piston airliner, six Avro Ashtons were constructed and although the type never entered series production the airframes provided an invaluable service in helping to develop many new aircraft and jet engine technologies. Avro Ashton 3, WB493, first flew on 18 December 1951 and subsequently joined the RAE's fleet of aircraft. In 1955 it went to the Bristol Engine Division at Filton as a testbed for Olympus and Orpheus turbojets. In this image, WB493 is seen at Filton in May 1963, and while at first glance it appears to be a twin-jet aeroplane, it was in fact four engined. WB493 was scrapped a month later, on 29 June 1963 – although one source suggests 30 September 1963.

Note FYI: Mark describes WB493 as a Mk.4, however, the three sources I've found say Mk.3!



Above and left: The Saunders-Roe (Saro) SR.53 was a composite rocket and jet-powered single-seat fighter research aircraft powered by a 1,750lb thrust Viper jet engine for 'normal cruising' purposes in the upper section of the fuselage with an 8,000lb thrust DH Spectre liquid-fuel rocket loitering below. The concept came about following a 1951 Air Ministry request to consider the viability of a high-performance point-defence fighter capable of dealing with the possible threat of high flying Soviet bombers attacking the UK. Saro's first SR.53, XD145, flew on 16 May 1957 from Boscombe Down and quickly displayed a notable capability by reaching 50,000ft in just two minutes. A second SR.53, XD151, was also built but it crashed on 5 June 1958 killing the pilot. RAF interest in the type was muted almost from the beginning for several practical reasons, while Ministry of Supply support was withdrawn in anticipation of the looming 1957 Defence White Paper and no further SR.53s were built. (see 4-view opposite)



Chapter 3: The 1960s



Above: Nine Blackburn Buccaneer NA.39 prototypes were ordered in June 1955 of which XK489 (nearest to the camera) was the fourth although, importantly, it was the first fully navalised NA.39 – XK486, 487 and 488 being rather more basic airframes. First flown on 31 January 1959, XK489 served with many establishments in preparation for the introduction of the Buccaneer S.1 into naval service including carrier landing trials aboard HMS Victorious, Centaur and Ark Royal at various times, as well as trialling modified flight controls and other systems. Used extensively, XK489 was withdrawn from use on 24 December 1963 and SOC on 22 September 1964 and dismantled.

The decade of the 1960s was one of considerable change within Britain's aircraft industry. The significant pace of post-war R&D, the success of developing a viable supersonic fighter in the shape of the English Electric Lightning, the many other achievements including the introduction in to service of the powerful V-Bomber fleet, should all have heralded continuing expansion and an onward trend in Britain's aviation industry and infrastructure. Instead, although much important work continued to take place, the 1960s saw the start of a significant and long-term contraction in the aircraft industry, and the growing necessity to find international partners in major programmes as the cost of developing new aircraft designs and technology began to ominously spiral. There were many factors that contributed to this unfortunate trend, but the overall effect was to lead to far fewer British designs being developed, with the obvious contraction in the necessity for R&D and flight testing in Britain.

Muddled government priorities, sometimes confused official specifications, the increasing dominance in the civil as well as the military sector of American designs, all contributed to the contraction of Britain's aircraft industry in the years and decades that followed the disastrous Sandys pronouncements of 1957. The most obvious manifestation of the future contraction of the aircraft industry at its highest levels was the creation in 1960 of the British Aircraft Corporation Ltd (BAC), which brought together several of Britain's major companies in the programme that led to the TSR.2 strike aircraft. This merger within the new BAC organisation of the significant parts of several companies including English Electric, Bristol and Vickers, was a pointer towards the eventual disappearance of several of the long-standing names in British aviation, and was an ominous foretaste of the eventual massive contraction in aircraft design and manufacture in Britain. Although in the short-term it appeared to be expedient for several companies to work together on future projects and requirements, particularly to meet the ever-spiralling costs of creating new designs and the ability to pool resources and talents, in the long-term (and of

course with the benefit of hindsight) this strategy has proven to be of no obvious benefit to Britain's aircraft industry.

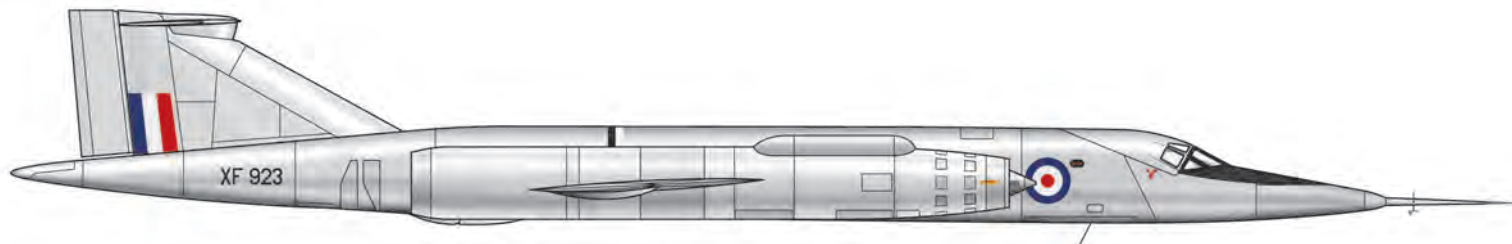
Unfortunately, just as the 1950s had seen the spectacular 'own-goal' of the Sandys White Paper, so the 1960s witnessed a further reason why Britain's aircraft industry was eventually reduced to a shadow of its former self, with associated implications for R&D and flight testing. The TSR.2 project, that had become such a focal point for the future of Britain's military aircraft prowess, was cancelled in 1965. This event was a calamity for the British aircraft industry, and resulted in many talented engineers and designers leaving the industry altogether, or going abroad where their talents would be appreciated and used properly.

The main purpose of creating the BAC conglomeration had been to develop and put into service the TSR.2, and its cancellation left the aircraft industry considerably weakened and

Continued on page 44



Left: Although of poor-quality, this colour photo of Bristol Type 188, XF926, is none-the-less significant as it probably dates from around the time the aircraft was put in to storage at Filton in the autumn of 1963. (See 4-view opposite)



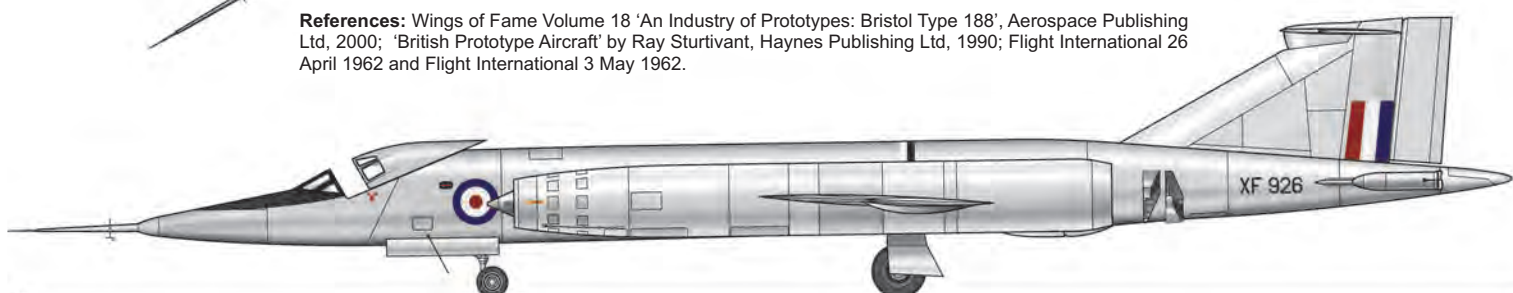
Bristol Type 188, XF923 (and XF926), Filton, 14 April 1962 and 29 April 1963 respectively

By the 1950s, the quest for an aircraft capable of reaching a sustained speed of Mach 2 in level flight was gathering momentum. In 1952, the Ministry of Supply issued a request for a design to not only achieve this speed, but also to investigate the effects of kinetic heating brought about by such high speeds. Under Specification ER.134T, a number of designs were submitted from various companies including English Electric, Boulton & Paul, Saunders-Roe and Hawker Aircraft. Among the contenders was the Type 188 from the Bristol Aeroplane Company. Initially, Armstrong Whitworth's AW.166 design was chosen as the winner, however that company was already heavily engaged in the production of the Gloster Javelin interceptor, so the Bristol Type 188 was chosen in its place. A contract for two airframes, serial numbers XF923 and XF926, was issued in February 1953.

Following structural tests, XF923 made its first flight on 14 April 1962, flying from Filton to Boscombe Down with chief test pilot Godfrey Auty at the controls. Powered by two afterburning de Havilland Gyron Junior PS.50/DGJ.10R turbojets, it enjoyed only a brief flying career. Numerous systems and engine problems were encountered throughout this time, notably with the afterburners, although Auty praised the aircraft's general handling and performance through the sub-supersonic speed envelope. The aircraft later took part in the SBAC show at Farnborough in September 1962, by this time having earned the sobriquet 'The Flaming Pencil' for obvious reasons.

XF923 passed into storage at Filton in November 1963, and was never cleared for supersonic speed; that task being assigned to XF926 which made its maiden flight on 29 April 1963, finally achieving a maximum Mach 1.88. Both aircraft were later fitted with an external braking parachute on the port rear fuselage, although the original tail-mounted chute was retained as an anti-spin measure. On one occasion, XF926's brake parachute streamed in supersonic flight, the effects of which must have been interesting to say the least! Note the fire extinguisher fairings on top of the engine nacelles; these were only fitted to XF923. The port side elevation depicts XF926 and shows the fuselage airbrakes deployed. Both aircraft were overall natural metal finish with standard national markings and black serial numbers.

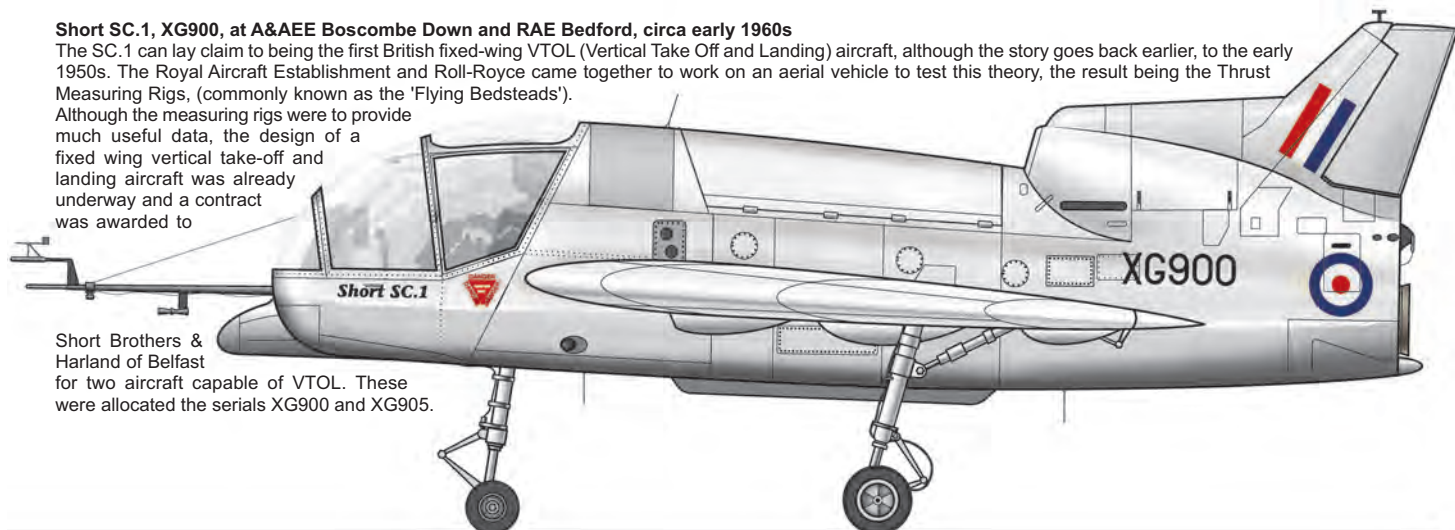
References: Wings of Fame Volume 18 'An Industry of Prototypes: Bristol Type 188', Aerospace Publishing Ltd, 2000; 'British Prototype Aircraft' by Ray Sturtivant, Haynes Publishing Ltd, 1990; Flight International 26 April 1962 and Flight International 3 May 1962.



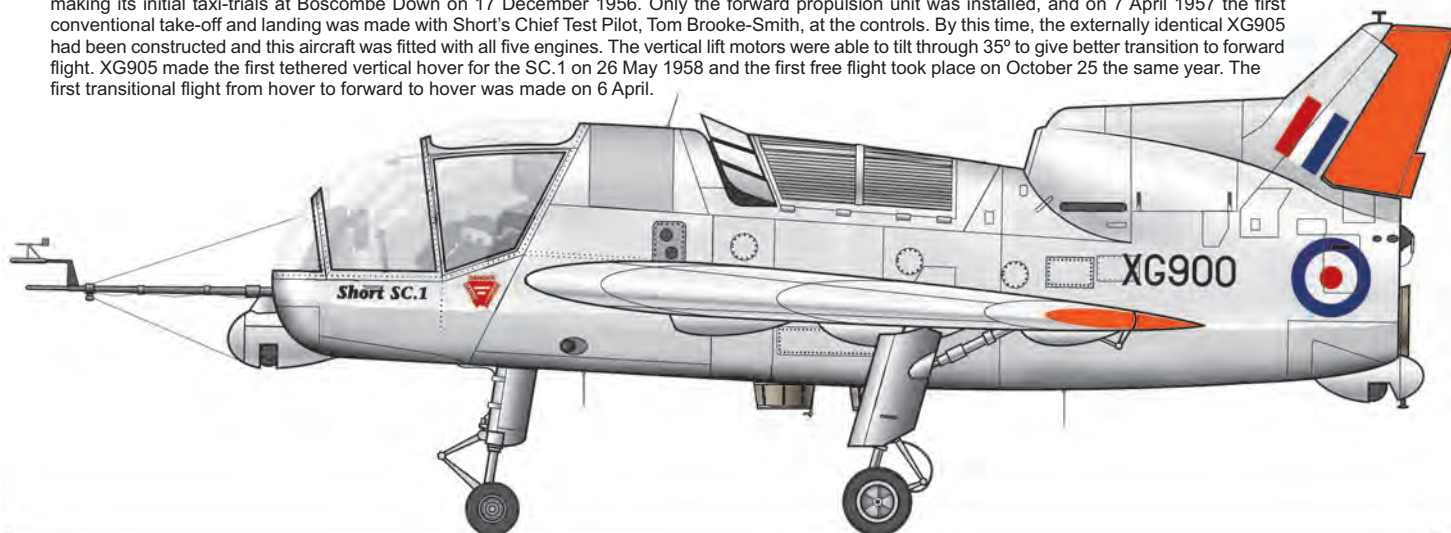
Short SC.1, XG900, at A&AEE Boscombe Down and RAE Bedford, circa early 1960s

The SC.1 can lay claim to being the first British fixed-wing VTOL (Vertical Take Off and Landing) aircraft, although the story goes back earlier, to the early 1950s. The Royal Aircraft Establishment and Roll-Royce came together to work on an aerial vehicle to test this theory, the result being the Thrust Measuring Rigs, (commonly known as the 'Flying Bedsteads'). Although the measuring rigs were to provide much useful data, the design of a fixed wing vertical take-off and landing aircraft was already underway and a contract was awarded to

Short Brothers & Harland of Belfast for two aircraft capable of VTOL. These were allocated the serials XG900 and XG905.



An odd beetle-like aircraft, the SC.1 was to be powered by five Rolls-Royce RB.108 turbojets (four of which were to be mounted vertically), with XG900 making its initial taxi-trials at Boscombe Down on 17 December 1956. Only the forward propulsion unit was installed, and on 7 April 1957 the first conventional take-off and landing was made with Short's Chief Test Pilot, Tom Brooke-Smith, at the controls. By this time, the externally identical XG905 had been constructed and this aircraft was fitted with all five engines. The vertical lift motors were able to tilt through 35° to give better transition to forward flight. XG905 made the first tethered vertical hover for the SC.1 on 26 May 1958 and the first free flight took place on October 25 the same year. The first transitional flight from hover to forward to hover was made on 6 April.



Tragedy struck however, when on 2 October 1963, XG905 experienced a severe control loss, and crashed, the pilot J R Green being killed, although the aircraft was rebuilt. A redesign was undertaken at this stage mainly to the cockpit area. By the mid-1960s, the VTOL concept had moved on apace with the introduction into the test circuit of the Hawker P.1127, and later Kestrel, with the unique rotating nozzle engine, and the mounted lift-jet concept employed on the SC.1 became redundant. XG900 was demoted to ground running test work only. Both aircraft were retired in 1971 – XG900 was sent to the Science Museum and other locations for display, whilst XG905 went back to Shorts.

XG900 was painted in an overall silver finish with black serials and national markings initially (upper profile) – with the Day-Glo areas (lower profile) added later.

Reference: 'British Prototype Aircraft' by Ray Sturtivant, Haynes Publishing Group



Above: The first British production De Havilland Chipmunk was T.10, WB549, which, following delivery on 17 November 1949 was subsequently used by the A&AEE and later the ETPS as seen in this image taken at Cranfield in 1962 with the Empire Test Pilots School's crest on the engine cowling. WB549 was probably used as a hack with this unit until sold to the civil market on 26 February 1973 to become G-BAPB. (See profile illustration of WD321 opposite)

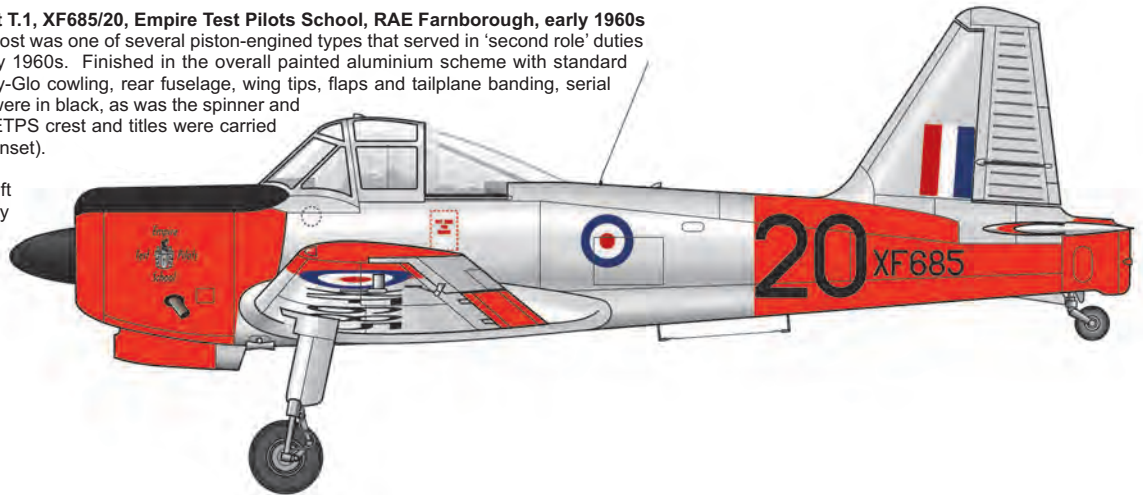
Left: Built in 1943, North American Harvard IIb, FT375, was one of three Harvards used by the A&AEE alongside KF183 (see profile illustration opposite) and KF314. FT375 was sold in the 1990s and registered as G-BWUL. It has changed hands several times since, but as of February 2015 was still flying with the Italian-registered 'G-BWUL Flying Group'.



Hunting Percival Provost T.1, XF685/20, Empire Test Pilots School, RAE Farnborough, early 1960s

This Hunting Percival Provost was one of several piston-engined types that served in 'second role' duties with the ETPS in the early 1960s. Finished in the overall painted aluminium scheme with standard national markings and Day-Glo cowling, rear fuselage, wing tips, flaps and tailplane banding, serial number and numeral '20' were in black, as was the spinner and the anti-glare panel. The ETPS crest and titles were carried on the cowlings sides (see inset).

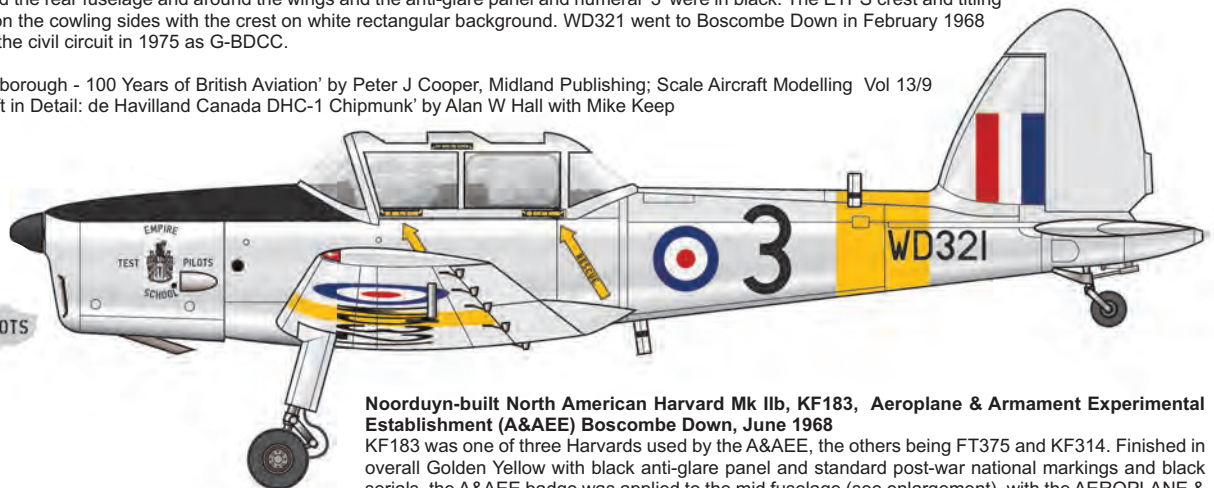
Reference: Scale Aircraft Modelling Vol 10/5 February 1988



De Havilland Chipmunk T.10, WD321/3, Empire Test Pilots School, RAE Farnborough, circa 1962

WD321 arrived at Farnborough in early 1956 and was subsequently used as a communications 'hack' between RAE Aberporth and Llanbedr. WD321 returned to Farnborough in 1958, where it was allocated to the ETPS. Painted overall silver/aluminium with standard national markings and black serials. Yellow 'Trainer bands' were carried around the rear fuselage and around the wings and the anti-glare panel and numeral '3' were in black. The ETPS crest and titling were also carried on the cowlings sides with the crest on white rectangular background. WD321 went to Boscombe Down in February 1968 and was put on to the civil circuit in 1975 as G-BDCC.

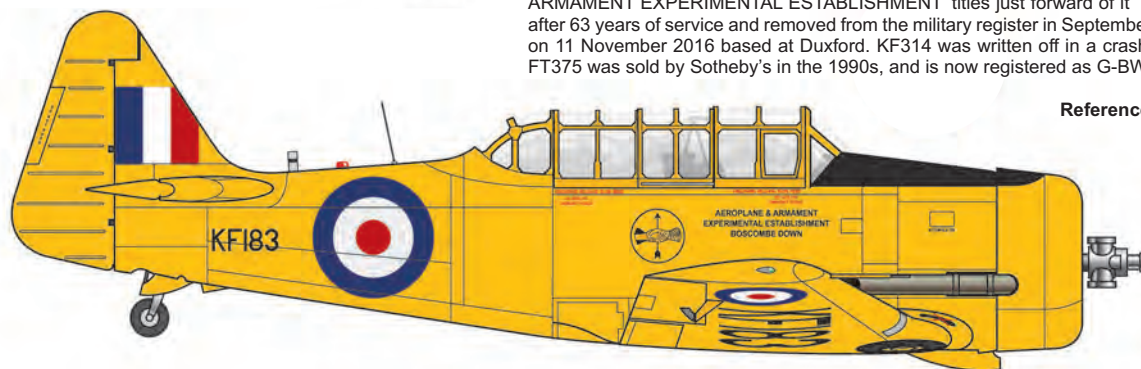
References: 'Farnborough - 100 Years of British Aviation' by Peter J Cooper, Midland Publishing; Scale Aircraft Modelling Vol 13/9 June 1991: 'Aircraft in Detail: de Havilland Canada DHC-1 Chipmunk' by Alan W Hall with Mike Keep



Noorduyn-built North American Harvard Mk IIb, KF183, Aeroplane & Armament Experimental Establishment (A&AEE) Boscombe Down, June 1968

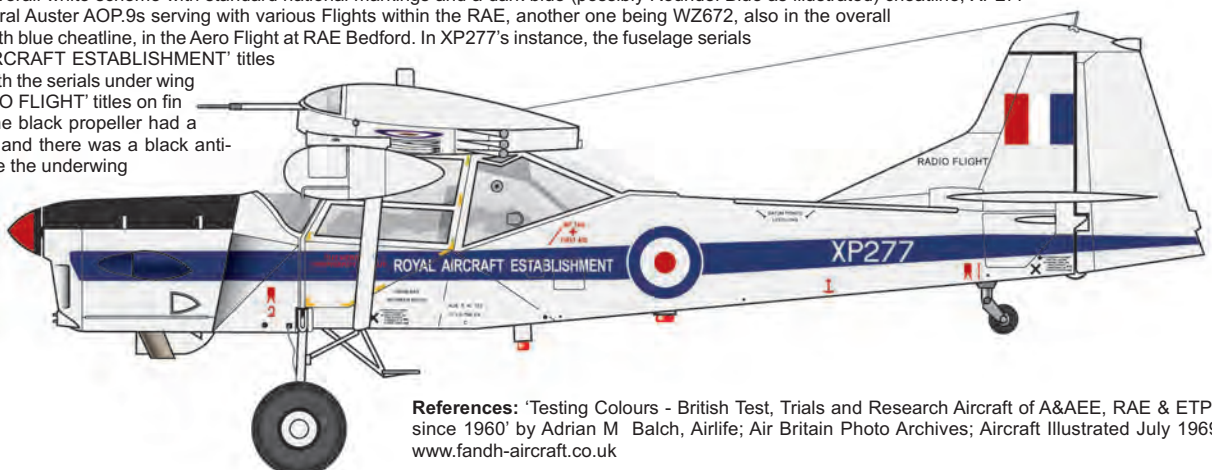
KF183 was one of three Harvards used by the A&AEE, the others being FT375 and KF314. Finished in overall Golden Yellow with black anti-glare panel and standard post-war national markings and black serials, the A&AEE badge was applied to the mid fuselage (see enlargement), with the 'AEROPLANE & ARMAMENT EXPERIMENTAL ESTABLISHMENT' titles just forward of it in black. KF183 was retired after 63 years of service and removed from the military register in September 2016. It became G-CORS on 11 November 2016 based at Duxford. KF314 was written off in a crash on 22 February 1982 and FT375 was sold by Sotheby's in the 1990s, and is now registered as G-BWUL.

Reference: Air Britain photo archives



Auster AOP.9, XP277, Radio Flight, RAE Farnborough, March 1969

Finished in an overall white scheme with standard national markings and a dark blue (possibly Roundel Blue as illustrated) cheatline, XP277 was one of several Auster AOP.9s serving with various Flights within the RAE, another one being WZ672, also in the overall white scheme with blue cheatline, in the Aero Flight at RAE Bedford. In XP277's instance, the fuselage serials and 'ROYAL AIRCRAFT ESTABLISHMENT' titles were in white; with the serials under wing in and the 'RADIO FLIGHT' titles on fin fillet in black. The black propeller had a red spinner cap and there was a black anti-glare panel. Note the underwing radome pod.

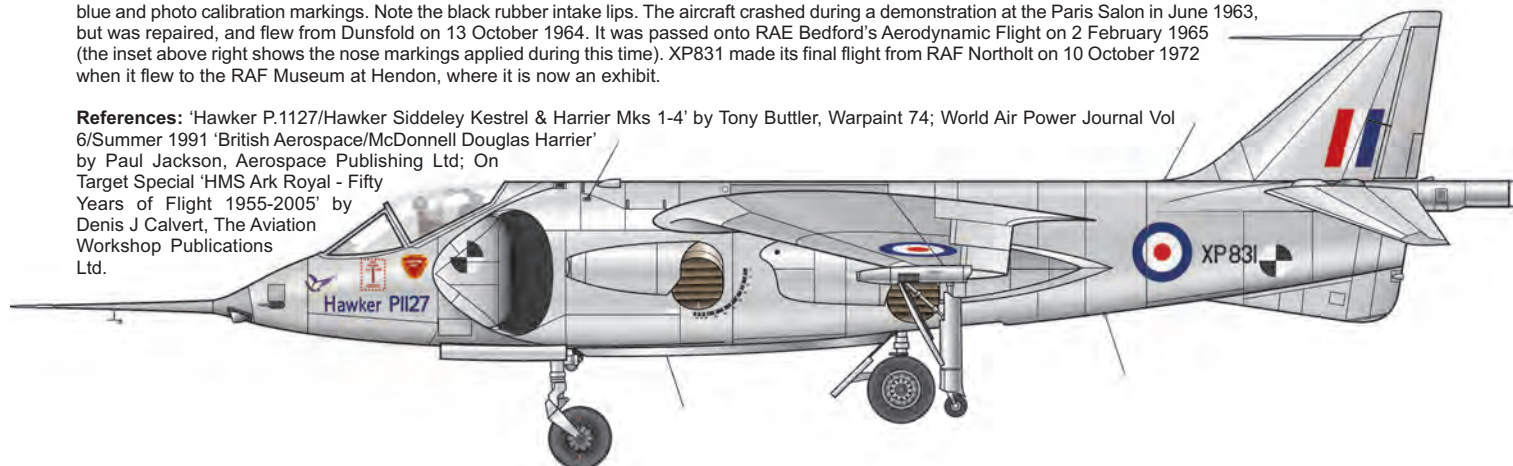


References: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife; Air Britain Photo Archives; Aircraft Illustrated July 1969; www.fandh-aircraft.co.uk

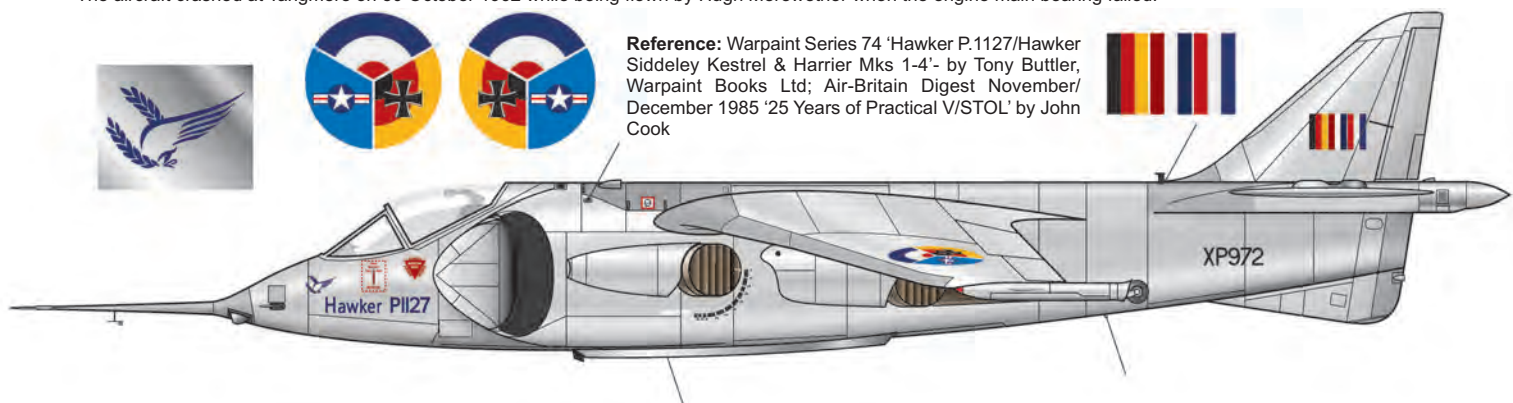
Hawker P.1127, XP831, Hawker Aircraft Company, February 1963

XP831 was the first airframe to be involved in the tethered flights in October/November 1960, flown by Hawker Siddeley Chief Test Pilot Alfred William 'Bill' Bedford at the controls. XP831 then went on to perform a vertical take-off followed by a circuit and then a short landing. It then performed a short take-off and flew a circuit followed by a vertical landing, proving the VSTOL concept and cementing the Harrier's future. XP831 is illustrated here at the time of the trials aboard HMS Ark Royal in the English Channel, in its overall natural metal scheme with national markings and serial number applied and Hawker logos and titles applied to the nose in dark blue and photo calibration markings. Note the black rubber intake lips. The aircraft crashed during a demonstration at the Paris Salon in June 1963, but was repaired, and flew from Dunsfold on 13 October 1964. It was passed onto RAE Bedford's Aerodynamic Flight on 2 February 1965 (the inset above right shows the nose markings applied during this time). XP831 made its final flight from RAF Northolt on 10 October 1972 when it flew to the RAF Museum at Hendon, where it is now an exhibit.

References: 'Hawker P.1127/Hawker Siddeley Kestrel & Harrier Mk 1-4' by Tony Buttler, Warpaint 74; World Air Power Journal Vol 6/Summer 1991 'British Aerospace/McDonnell Douglas Harrier' by Paul Jackson, Aerospace Publishing Ltd; On Target Special 'HMS Ark Royal - Fifty Years of Flight 1955-2005' by Denis J Calvert, The Aviation Workshop Publications Ltd.

**Hawker P.1127, XP972, Hawker Aircraft Company, as displayed at Farnborough on 7 September 1962**

Carrying the markings of the Tripartite Evaluation Squadron on the wing upper surfaces (see insets), formed by the UK, United States of America and West Germany, XP972 was fitted with the Pegasus 2 engine, and made its first flight on 5 April 1962. It was the third P.1127 built, and the first of a four-aircraft development batch comprising XP972, XP976, XP980 and XP984. It was used for wing development testing and is shown here with the wing planform that would eventually be used on the Kestrel. In an overall natural aluminium finish with black serials, while at Farnborough the dark blue 'Hawker P.1127' titles and Hawker logo on nose were carried. The aircraft crashed at Tangmere on 30 October 1962 while being flown by Hugh Merewether when the engine main bearing failed.



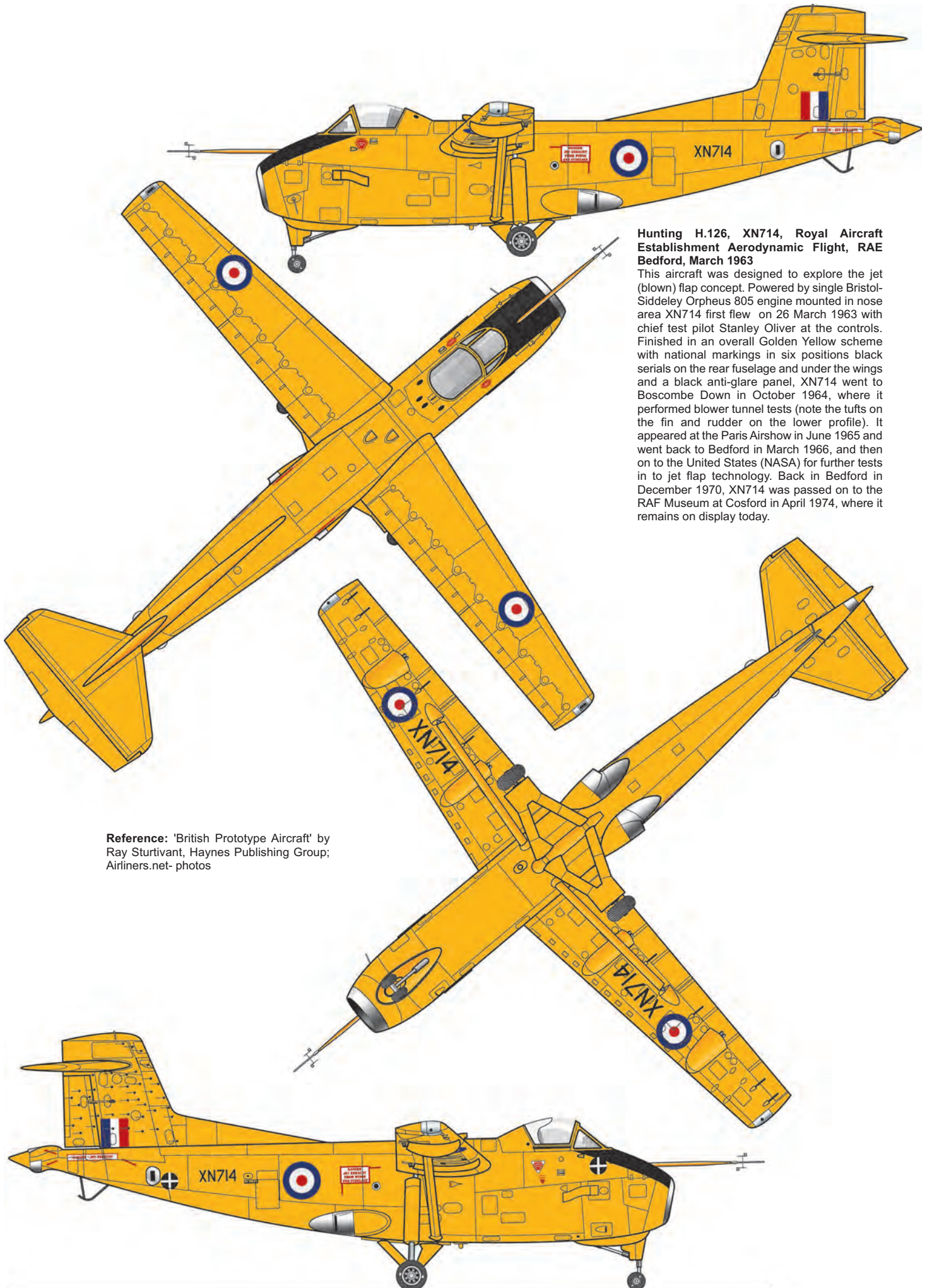
Reference: Warpaint Series 74 'Hawker P.1127/Hawker Siddeley Kestrel & Harrier Mk 1-4' by Tony Buttler, Warpaint Books Ltd; Air-Britain Digest November/December 1985 '25 Years of Practical V/STOL' by John Cook



Above left: Hawker Siddeley Kestrel FGA.1, XS688, photographed at Farnborough in September 1964, represented the next stage of VTOL development between the P1127 and Harrier GR.1. XS688 clearly displays the markings of the Tri-partite Evaluation Squadron consisting of the UK, USA and West Germany, as well as its black inflatable rubber intake lips.

Above: Hawker Siddeley P.1127, XP831, seen here quite late on in its life in September 1966, was used to develop the concept of jet-powered vertical take off and landing, or VTOL, which led to the eventual development and production of the Harrier GR.1 which entered RAF service in 1969.

Left: Designed to explore the concept of blown flaps, the Hunting H.126, XN714, first flew on 26 March 1963 and went to Boscombe Down in October 1964. This photo is believed to have been taken at the 1965 Paris Airshow, although it is not certain. (See 4-view opposite)



Hunting H.126, XN714, Royal Aircraft Establishment Aerodynamic Flight, RAE Bedford, March 1963

This aircraft was designed to explore the jet (blown) flap concept. Powered by single Bristol-Siddeley Orpheus 805 engine mounted in nose area XN714 first flew on 26 March 1963 with chief test pilot Stanley Oliver at the controls. Finished in an overall Golden Yellow scheme with national markings in six positions black serials on the rear fuselage and under the wings and a black anti-glare panel, XN714 went to Boscombe Down in October 1964, where it performed blower tunnel tests (note the tufts on the fin and rudder on the lower profile). It appeared at the Paris Airshow in June 1965 and went back to Bedford in March 1966, and then on to the United States (NASA) for further tests in to jet flap technology. Back in Bedford in December 1970, XN714 was passed on to the RAF Museum at Cosford in April 1974, where it remains on display today.

Reference: 'British Prototype Aircraft' by Ray Sturtivant, Haynes Publishing Group; Airliners.net- photos

Continued from page 38

without a recognisable sense of direction as far as military aircraft programmes were concerned. Subsequent efforts to purchase the American General Dynamics F-111 swing-wing strike aircraft also eventually collapsed. A considerable amount of design and research work for the TSR.2 had been undertaken at the time of the ending of the programme, and a considerable amount of taxpayers' money had been spent on a project that eventually went nowhere. Nevertheless, some benefits did eventually arise from the ashes of the TSR.2 programme, including development work on terrain-following capability that was later to gain great importance for other projects.

On a more positive note, the 1960s also witnessed the developing importance of international co-operation in aircraft programmes. The most obvious example of this was the Anglo-French Concorde civil airliner project, which developed into a highly successful collaborative venture that placed the British and French aircraft industries ahead of the rest of the world in this high-profile programme. A considerable amount of design work and flight testing was carried out in Britain as well as in France in support of what grew into the Concorde story, and it became one of the highlights of the 1960s for the British aircraft industry.

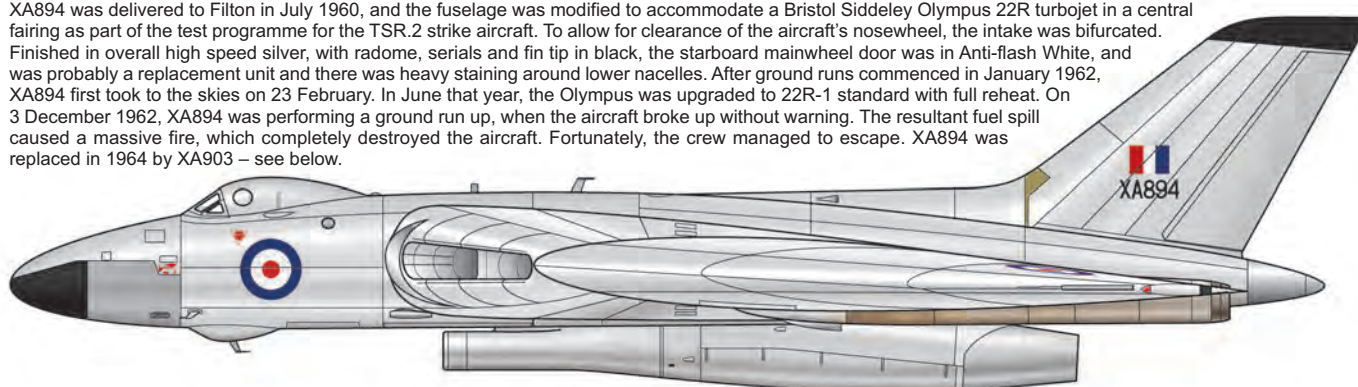
Considerable work was performed by the RAE into the many advanced aspects of the Concorde design. At Bedford, much flight testing took place into wing shapes and the handling qualities of wing designs that were tried out for the Concorde layout. A number of aircraft, such as the Bedford Aero Flight's Handley-Page HP.115, became significant participants in the programme. Also included was the world record-breaking Fairey Delta 2, WG774, which was extensively re-built as the BAC 221 as a part of the Concorde research project.

Although the Concorde was a civil airliner project, it had nevertheless required the close involvement of the considerable expertise of the RAE. This illustrated the significant point that the important relationship between the RAE and the wider aircraft industry had continued to exist despite the cut-backs and uncertainties of the era. It is important to point out that in addition to the considerable and vital work that the RAE and the A&AEE performed for the British military, there was also a long and necessary tradition of similar collaboration over civil projects. This had existed since British civil aviation was commenced again as a properly independent entity as World War Two was ending and in the immediate post-war period.

Continued on page 48

Avro Vulcan B.1, XA894, Bristol Siddeley Engines Ltd, February 1962

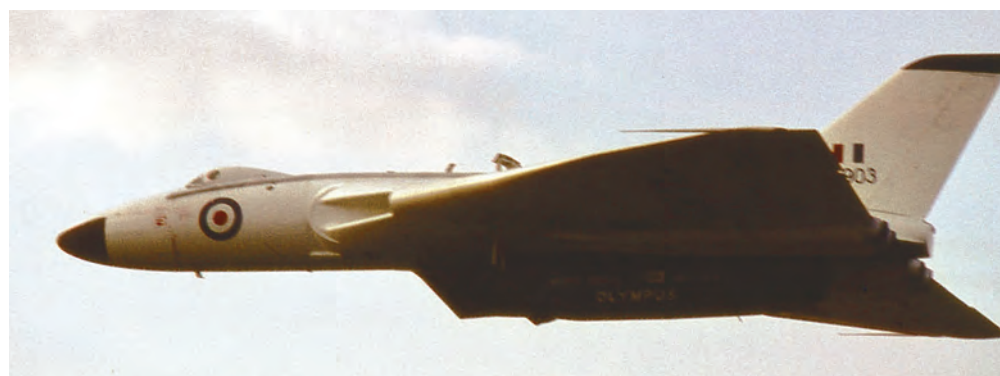
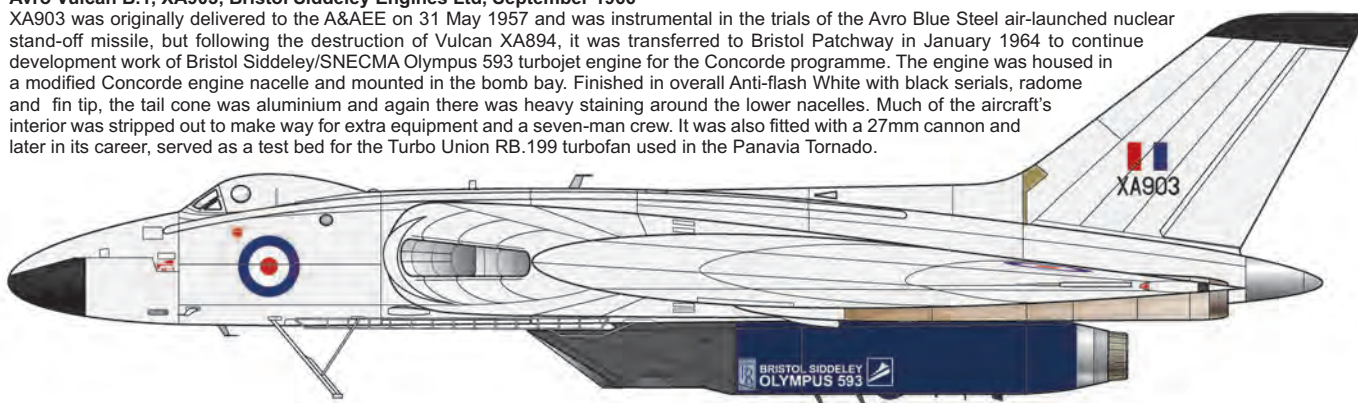
XA894 was delivered to Filton in July 1960, and the fuselage was modified to accommodate a Bristol Siddeley Olympus 22R turbojet in a central fairing as part of the test programme for the TSR.2 strike aircraft. To allow for clearance of the aircraft's nosewheel, the intake was bifurcated. Finished in overall high speed silver, with radome, serials and fin tip in black, the starboard mainwheel door was in Anti-flash White, and was probably a replacement unit and there was heavy staining around lower nacelles. After ground runs commenced in January 1962, XA894 first took to the skies on 23 February. In June that year, the Olympus was upgraded to 22R-1 standard with full reheat. On 3 December 1962, XA894 was performing a ground run up, when the aircraft broke up without warning. The resultant fuel spill caused a massive fire, which completely destroyed the aircraft. Fortunately, the crew managed to escape. XA894 was replaced in 1964 by XA903 – see below.



Reference: Wings of Fame Vol 3 'Vulcan- Delta Force' by Paul Jackson, Aerospace Publishing Ltd; see also <http://www.aviationarchive.org.uk/stories/pages.php?enum=GE131&pnum=1&maxp=3> and http://www.avrovulcan.org.uk/other_photographers/894_farnborough_1.htm

Avro Vulcan B.1, XA903, Bristol Siddeley Engines Ltd, September 1966

XA903 was originally delivered to the A&AEE on 31 May 1957 and was instrumental in the trials of the Avro Blue Steel air-launched nuclear stand-off missile, but following the destruction of Vulcan XA894, it was transferred to Bristol Patchway in January 1964 to continue development work of Bristol Siddeley/SNECMA Olympus 593 turbojet engine for the Concorde programme. The engine was housed in a modified Concorde engine nacelle and mounted in the bomb bay. Finished in overall Anti-flash White with black serials, radome and fin tip, the tail cone was aluminium and again there was heavy staining around the lower nacelles. Much of the aircraft's interior was stripped out to make way for extra equipment and a seven-man crew. It was also fitted with a 27mm cannon and later in its career, served as a test bed for the Turbo Union RB.199 turbofan used in the Panavia Tornado.



References: Wings of Fame Vol 3 'Vulcan - Delta Force' by Paul Jackson, Aerospace Publishing Ltd; 'Vulcan - Last of the V-Bombers' by Duncan Cubitt, Osprey Aerospace; Air Britain photo archives; On Target Special 'V-Bombers - Britain's Cold War Nuclear Deterrent' by Glenn Sands & Gary Madgwick, The Aviation Workshop Publications Ltd; Mark Rolfe private archives

Left: Avro Vulcan B.1, XA903, seen testing the Bristol Siddeley/SNECMA Olympus 593 jet engine in connection with the Concorde programme, the test engine can be seen mounted in the bomb bay.

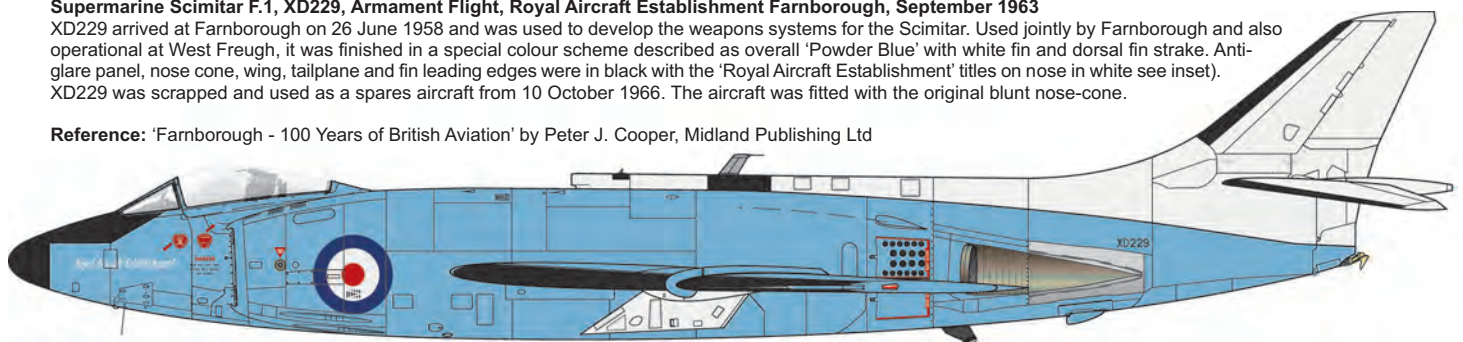


Above and left: Two images of Supermarine Swift F.7, XF114, from the Royal College of Aeronautics, Cranfield, in June 1966 displaying its distinctive overall black paint scheme with white Union Flag marking on its upper fuselage and a sliding 'Donald Duck' cartoon on its nose. Presumably the latter was indicative of the fact that this airframe spent its entire life on aquaplaning duties at various establishments until retired in April 1967, ten years after XF114 had been delivered to Boscombe Down.

Supermarine Scimitar F.1, XD229, Armament Flight, Royal Aircraft Establishment Farnborough, September 1963

XD229 arrived at Farnborough on 26 June 1958 and was used to develop the weapons systems for the Scimitar. Used jointly by Farnborough and also operational at West Freugh, it was finished in a special colour scheme described as overall 'Powder Blue' with white fin and dorsal fin strake. Anti-glare panel, nose cone, wing, tailplane and fin leading edges were in black with the 'Royal Aircraft Establishment' titles on nose in white (see inset). XD229 was scrapped and used as a spares aircraft from 10 October 1966. The aircraft was fitted with the original blunt nose-cone.

Reference: 'Farnborough - 100 Years of British Aviation' by Peter J. Cooper, Midland Publishing Ltd

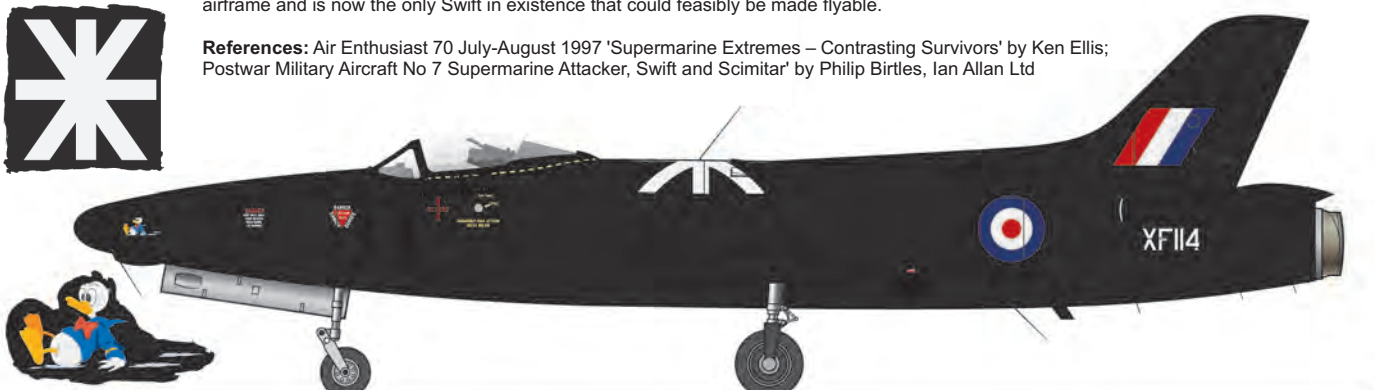


Royal Aircraft Establishment

Supermarine Swift F.7, XF114, Royal College of Aeronautics, Cranfield, June 1966

XF114 first arrived at A&AEE Boscombe Down on 14 March 1957. Initially in standard RAF Day Fighter camouflage, XF114 acquired the overall gloss black scheme with white serials and Union Flag-style marking on upper fuselage in the late 1950s/early 1960s and spent its entire life on aquaplaning test runs at Boscombe Down and other establishments up until her retirement from Cranfield in April 1967. Over time, the overall gloss black scheme became quite weathered, and a 'Donald Duck' cartoon figure was painted on nose. Placed into storage at Aston Down, XF114 went onto Flintshire Technical College to be used as an instructional airframe and is now the only Swift in existence that could feasibly be made flyable.

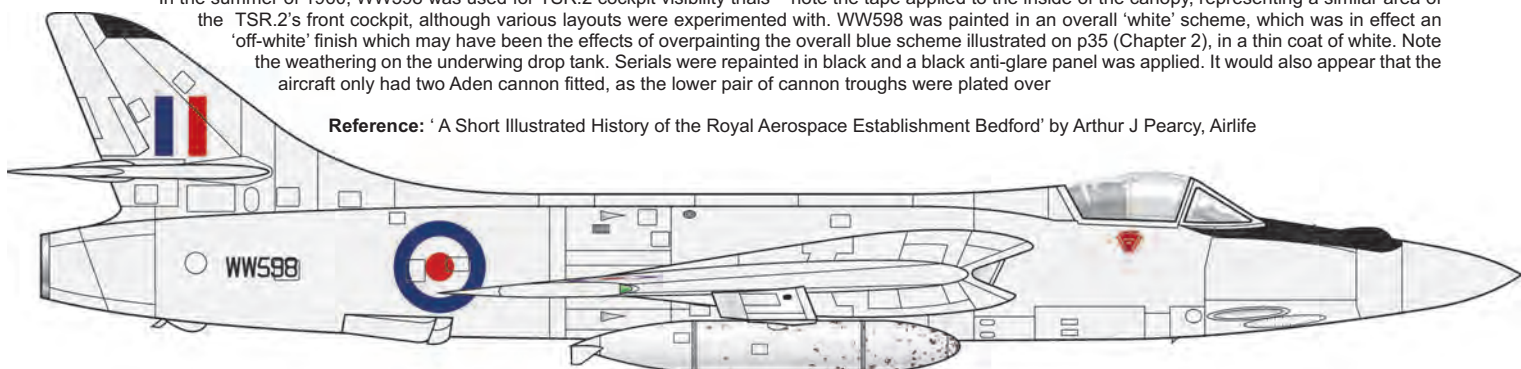
References: Air Enthusiast 70 July-August 1997 'Supermarine Extremes – Contrasting Survivors' by Ken Ellis; Postwar Military Aircraft No 7 Supermarine Attacker, Swift and Scimitar' by Philip Birtles, Ian Allan Ltd



Hawker Hunter F.6 (converted to P.1109A spec), WW598, Royal Aerospace Establishment, Bedford, August 1960

In the summer of 1960, WW598 was used for TSR.2 cockpit visibility trials – note the tape applied to the inside of the canopy, representing a similar area of the TSR.2's front cockpit, although various layouts were experimented with. WW598 was painted in an overall 'white' scheme, which was in effect an 'off-white' finish which may have been the effects of overpainting the overall blue scheme illustrated on p35 (Chapter 2), in a thin coat of white. Note the weathering on the underwing drop tank. Serials were repainted in black and a black anti-glare panel was applied. It would also appear that the aircraft only had two Aden cannon fitted, as the lower pair of cannon troughs were plated over

Reference: 'A Short Illustrated History of the Royal Aerospace Establishment Bedford' by Arthur J Pearcy, Airlife

**Gloster 'Gyron Junior' Javelin FAW.1, XA552, De Havilland Engine Company, summer 1961**

XA552 was converted by Napier & Son to test the low speed handling qualities of the de Havilland Gyron Junior turbojet engine for eventual use in the Bristol 188 high-speed research aircraft programme. (see p39). It should be noted however that the engines used on the Bristol 188 were of considerably higher power. Finished in an overall gloss Royal Blue scheme with gold/orange lettering on the nose, and national markings thinly outlined in white, the serial number was applied to fin in white. From the photographic references used, it was impossible to discern with any real accuracy what the lettering was under the 'De Havilland Gyron Junior' script, so it has merely been represented by a dotted rectangle pending further information being available. In March 1963, XA552 was delivered to Rolls Royce at Filton where it undertook engine tests until May of the same year. However, after a mere eleven flying hours the engines were removed and used as spares for the Bristol 188 programme. With the exceptions of the engines and the colour scheme, the other most noticeable change from a standard Javelin FAW.1 was the truncated rear fuselage jet pipe area.

References: Warpaint 17 'Gloster Javelin' by Tony Butler AMRAeS, Warpaint Books Ltd; 'Postwar Military Aircraft 1: Gloster Javelin' by Maurice Allward, Ian Allan

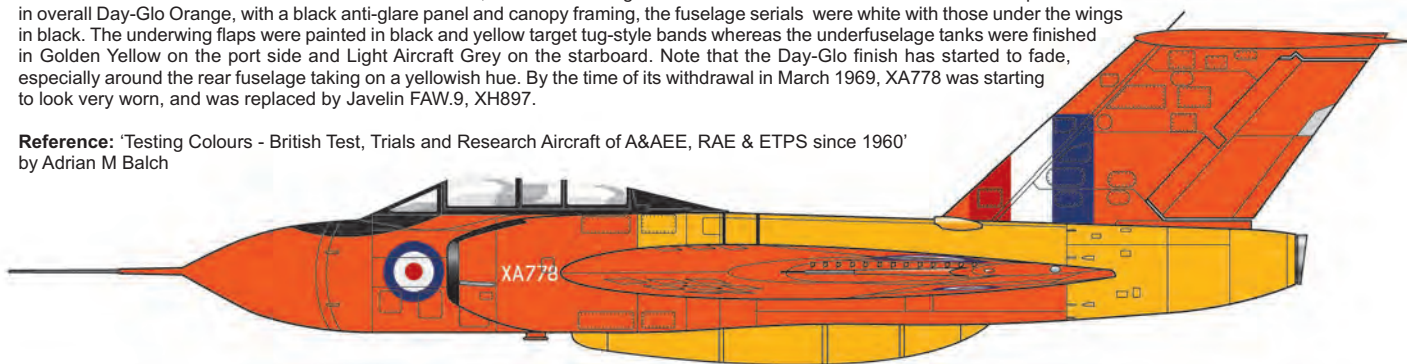
DE HAVILLAND

Gyron Junior

**Gloster Javelin FAW.2, XA778, A&AEE Boscombe Down, September 1967**

XA778 was delivered to Boscombe Down in March 1961, and was flown against other aircraft to measure and calibrate airspeed. Finished in overall Day-Glo Orange, with a black anti-glare panel and canopy framing, the fuselage serials were white with those under the wings in black. The underwing flaps were painted in black and yellow target tug-style bands whereas the underfuselage tanks were finished in Golden Yellow on the port side and Light Aircraft Grey on the starboard. Note that the Day-Glo finish has started to fade, especially around the rear fuselage taking on a yellowish hue. By the time of its withdrawal in March 1969, XA778 was starting to look very worn, and was replaced by Javelin FAW.9, XH897.

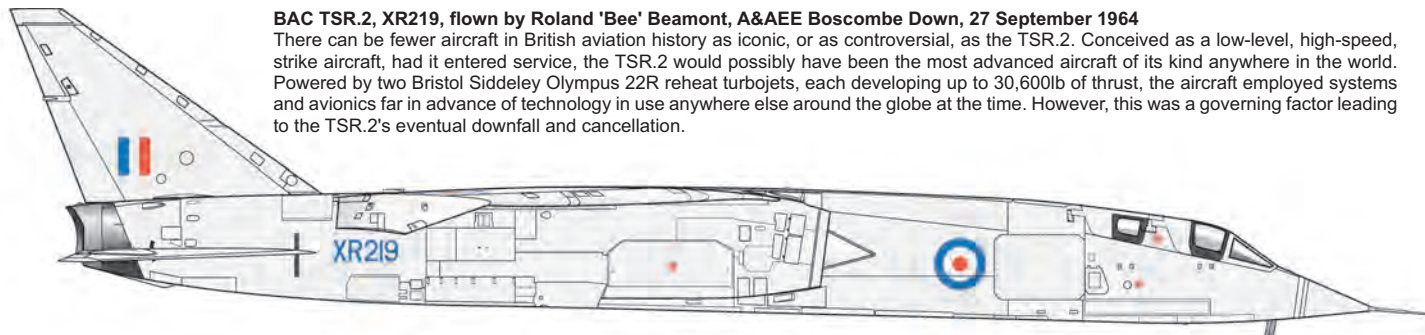
Reference: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch



Left: Of striking appearance, Gloster Javelin, XA778, was photographed in September 1967 while still in use with the A&AEE, although by this time its Dayglo surfaces were looking rather tired. Delivered to Boscombe Down in March 1961, FAW.2, XA778, was a hybrid machine that had previously been modified to act as the prototype Javelin FAW.7 and, later, received FAW.8 flying controls. Withdrawn in March 1969, XA778 was replaced by FAW.9, XH897. (See profile above)

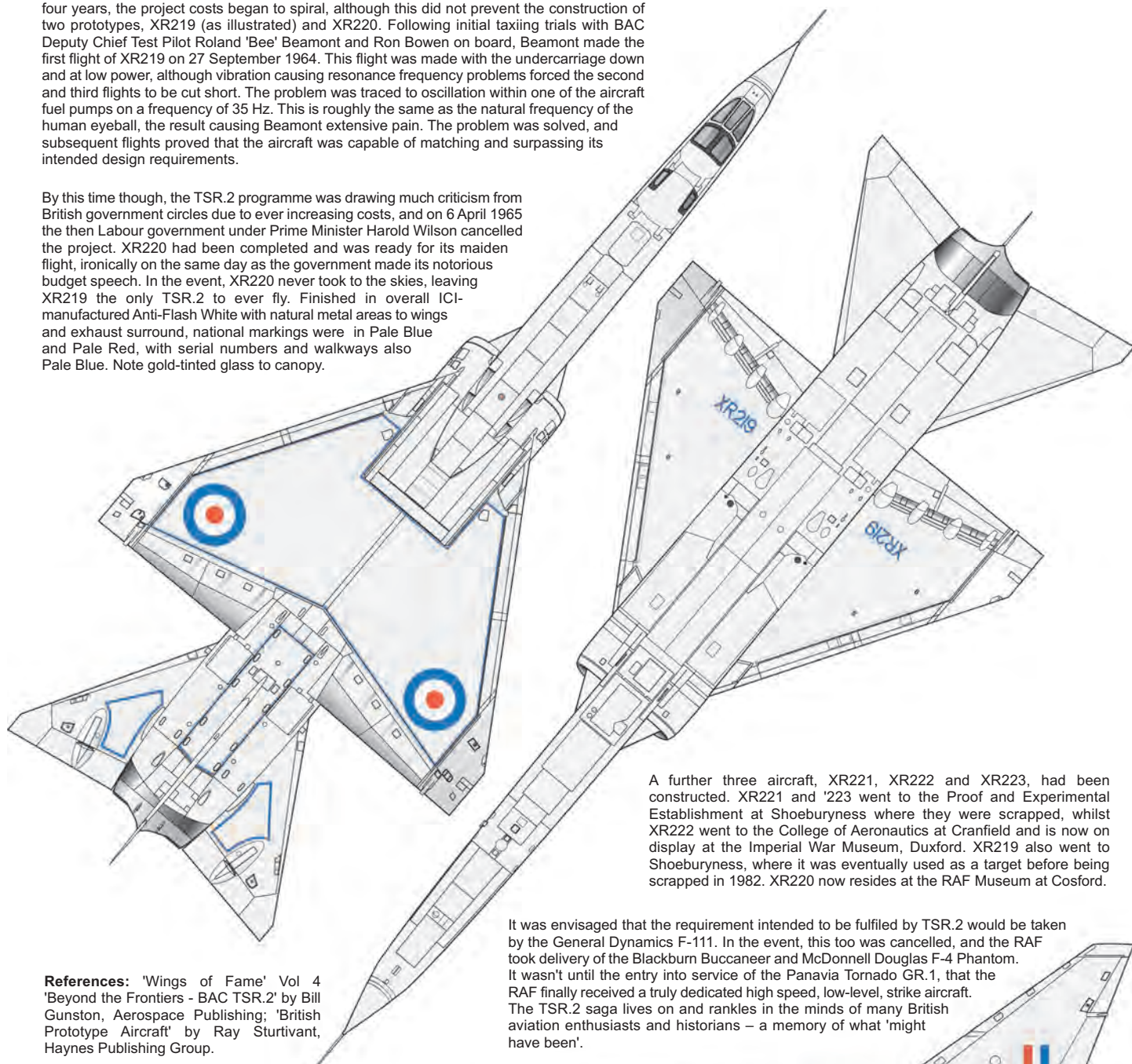
BAC TSR.2, XR219, flown by Roland 'Bee' Beamont, A&AEE Boscombe Down, 27 September 1964

There can be fewer aircraft in British aviation history as iconic, or as controversial, as the TSR.2. Conceived as a low-level, high-speed, strike aircraft, had it entered service, the TSR.2 would possibly have been the most advanced aircraft of its kind anywhere in the world. Powered by two Bristol Siddeley Olympus 22R reheat turbojets, each developing up to 30,600lb of thrust, the aircraft employed systems and avionics far in advance of technology in use anywhere else around the globe at the time. However, this was a governing factor leading to the TSR.2's eventual downfall and cancellation.



The British Aircraft Corporation was born following the merger of English Electric Aviation, the Bristol Aeroplane Company, Hunting Aircraft and Vickers-Armstrong in July 1960. A contract for nine development aircraft, XR219 to XR227 was placed in October 1960. These were to be followed by a further batch of eleven aircraft, XS660 to XS770. However, during the following four years, the project costs began to spiral, although this did not prevent the construction of two prototypes, XR219 (as illustrated) and XR220. Following initial taxiing trials with BAC Deputy Chief Test Pilot Roland 'Bee' Beamont and Ron Bowen on board, Beamont made the first flight of XR219 on 27 September 1964. This flight was made with the undercarriage down and at low power, although vibration causing resonance frequency problems forced the second and third flights to be cut short. The problem was traced to oscillation within one of the aircraft fuel pumps on a frequency of 35 Hz. This is roughly the same as the natural frequency of the human eyeball, the result causing Beamont extensive pain. The problem was solved, and subsequent flights proved that the aircraft was capable of matching and surpassing its intended design requirements.

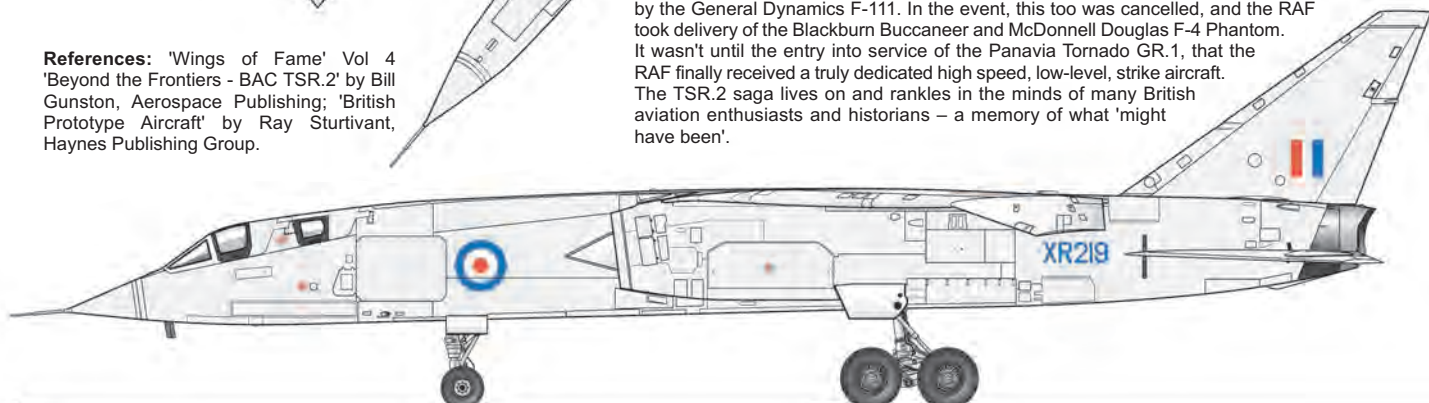
By this time though, the TSR.2 programme was drawing much criticism from British government circles due to ever increasing costs, and on 6 April 1965 the then Labour government under Prime Minister Harold Wilson cancelled the project. XR220 had been completed and was ready for its maiden flight, ironically on the same day as the government made its notorious budget speech. In the event, XR220 never took to the skies, leaving XR219 the only TSR.2 to ever fly. Finished in overall ICI-manufactured Anti-Flash White with natural metal areas to wings and exhaust surround, national markings were in Pale Blue and Pale Red, with serial numbers and walkways also Pale Blue. Note gold-tinted glass to canopy.



A further three aircraft, XR221, XR222 and XR223, had been constructed. XR221 and '223 went to the Proof and Experimental Establishment at Shoeburyness where they were scrapped, whilst XR222 went to the College of Aeronautics at Cranfield and is now on display at the Imperial War Museum, Duxford. XR219 also went to Shoeburyness, where it was eventually used as a target before being scrapped in 1982. XR220 now resides at the RAF Museum at Cosford.

References: 'Wings of Fame' Vol 4 'Beyond the Frontiers - BAC TSR.2' by Bill Gunston, Aerospace Publishing; 'British Prototype Aircraft' by Ray Sturtivant, Haynes Publishing Group.

It was envisaged that the requirement intended to be fulfilled by TSR.2 would be taken by the General Dynamics F-111. In the event, this too was cancelled, and the RAF took delivery of the Blackburn Buccaneer and McDonnell Douglas F-4 Phantom. It wasn't until the entry into service of the Panavia Tornado GR.1, that the RAF finally received a truly dedicated high speed, low-level, strike aircraft. The TSR.2 saga lives on and rankles in the minds of many British aviation enthusiasts and historians – a memory of what 'might have been'.



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Indeed, in a further reflection of the close ties between the wider industry and the test establishments, a number of aircraft types actually made their maiden flights from Boscombe Down rather than at the manufacturers' own airfields. These famously included the TSR.2, which first flew from Boscombe Down in September 1964, (interestingly, the second prototype TSR.2 was damaged while being transported by road to the Wiltshire airfield to make its first flight). In a wider context, an 'Approved Firm' scheme had been instituted during the 1950s between the industry and the A&AEE for data sharing and verification, particularly over performance testing by the aircraft companies of their products.

The Concorde programme was not the only important collaborative venture of the 1960s that illustrated the growing significance of international co-operation between allied countries into the creation of new designs. The increasing cost and complexity of new aircraft programmes, or the upgrading of existing types – and the increasingly long lead-time in creating new projects – was, even at that time, resulting in the growing necessity for more than one country to bear by means of a collaborative arrangement the substantial costs for R&D, promotion, prototype construction, test flying, and eventually the costs of production, for new aircraft ventures.

Further projects of the 1960s, such as the Anglo-French SEPECAT Jaguar programme that commenced in 1966 and led to the successful service introduction of the Jaguar twin-engined strike and training aircraft during the 1970s, were illustrative of this growing trend. Indeed, during the 1950s following the formation of NATO, (which actually took place in the late 1940s), a number of foreign aircraft types had been briefly evaluated by Boscombe Down test pilots in an effort to assess their wider suitability for their possible common adoption by a number of NATO air forces. Such exotic types as the Breguet Taon light strike fighter proposal from France had briefly taken the attention of the A&AEE test pilots, although in the event the concept that led to these trials of NATO standardisation on a single type was not carried through to a conclusion as originally intended.

Nevertheless, an excellent example of British ingenuity started to come to fruition during the 1960s, and in so doing demonstrated the necessary processes needed to successfully bring a concept into reality, to begin with through the initial research and development phases, to prototype building and flight testing, in order to evaluate the concept being developed, and thence to pre-production development and eventually production status. This project was the Hawker Siddeley Harrier V/STOL programme, which eventually saw the successful service introduction of the world's first vertical take-off front-line combat aircraft.

The road to the successful realisation of this project was a long one, and involved considerable work by the aircraft industry and both the RAE and the A&AEE, with extensive co-operation being achieved. It included a large amount of proving that

started, as far as flight testing was concerned, with the Rolls-Royce Thrust Measuring Rig, (the famous 'Flying Bedstead' of the 1950s), and thence to the Short SC.1 before the P.1127, Kestrel development aircraft and finally the Harrier production aircraft were successfully flown. The Harrier, which entered RAF service from 1969 onwards, and later the navalised Sea Harrier, was one of the finest examples of the endeavours to create the very best and most advanced front-line military aircraft by the post-war British aircraft industry.

Although the work of the RAE and the A&AEE was usually hidden from public view, it was thanks to the Harrier that the A&AEE became much more highly publicised during 1969. In that year a transatlantic air race was sponsored by the 'Daily Mail' newspaper. Amongst the contestants was a two-aircraft Harrier entry, comprising two of the very early Harrier GR.1 aircraft. Although technically RAF-operated Harriers, they were flown by two A Squadron pilots from Boscombe Down, and in the westbound race from the Post Office Tower in London to the Empire State Building in New York the Harrier entry was the winner. Considerable popular interest was generated in the event, and the two Harrier pilots, Squadron Leaders T Lecky-Thompson and Graham Williams, became genuine personalities.

On a more mundane but equally significant level, the A&AEE's work with the Harrier was a long and fruitful period in which much development work was accomplished from the late 1960s onwards, including considerable weapons clearance work and proving. Although the Harrier was a unique aircraft type because of its V/STOL capabilities, the variety of long-running development and clearance-for-service work that was performed by the A&AEE on the Harrier mirrored that performed on many other aircraft types for British military service. It must also be remembered that not all of this work was carried out in Britain. The Harrier, for example, underwent cold weather testing in Canada in 1969/1970, and hot weather trials in the Arizona desert in the United States, as a part of the testing for its acceptance for front-line service.

An important organisation returned to Boscombe Down in the 1960s in the form of the ETPS. Having spent two decades at Farnborough, the school returned to Boscombe Down in 1968, where it has remained ever since. During its time at Farnborough it had taken on, during 1963, a rotary wing course for prospective test pilots of helicopter designs. This reflected the, by then, great importance of the helicopter in many air forces and naval air arms. Indeed, the helicopter was no stranger to the test establishments at Farnborough and Boscombe Down. From the earliest days of military helicopter flying in the 1940s, helicopters had been tested for their service suitability at Boscombe Down and much R&D work had been undertaken at Farnborough. The ETPS itself had taken on charge a number of helicopter types during the later 1950s, and helicopter testing was to become as important as that carried out on fixed-wing aircraft in the decades that followed right up to the present day.

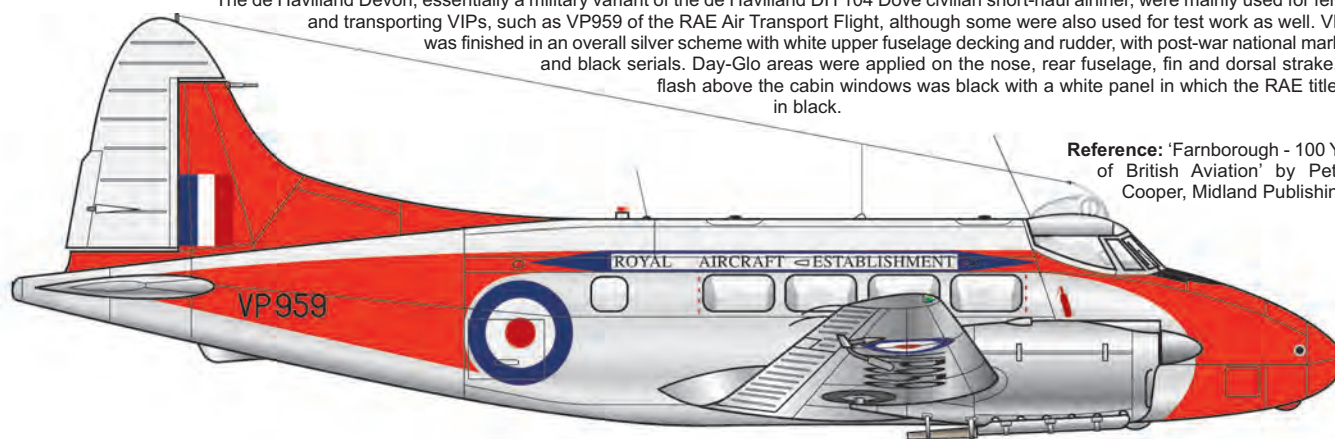
Below: De Havilland Devon C.2, VP975, belonging to RAE Farnborough's Air Transport Flight circa September 1964. (See profile opposite)



De Havilland DH 104 Devon C.1, VP959, RAE Farnborough Air Transport Flight, June 1962

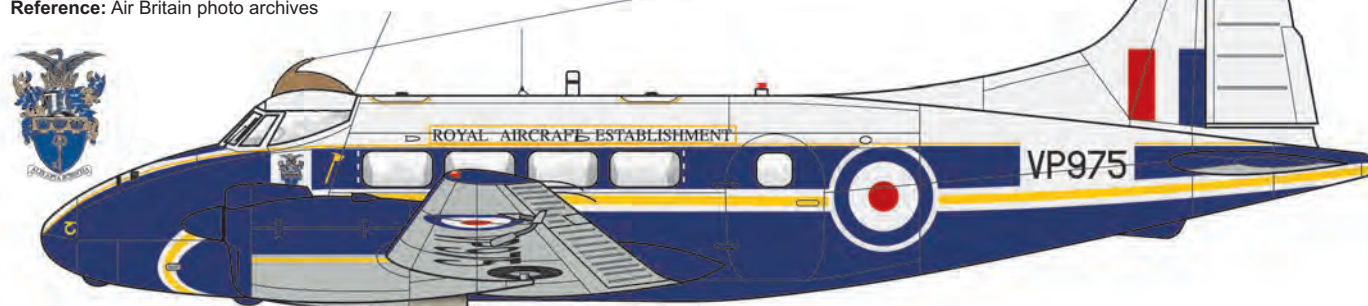
The de Havilland Devon, essentially a military variant of the de Havilland DH 104 Dove civilian short-haul airliner, were mainly used for ferrying and transporting VIPs, such as VP959 of the RAE Air Transport Flight, although some were also used for test work as well. VP959 was finished in an overall silver scheme with white upper fuselage decking and rudder, with post-war national markings and black serials. Day-Glo areas were applied on the nose, rear fuselage, fin and dorsal strake. The flash above the cabin windows was black with a white panel in which the RAE title was in black.

Reference: 'Farnborough - 100 Years of British Aviation' by Peter J Cooper, Midland Publishing

**De Havilland DH 104 Devon C.2, VP975, RAE Farnborough Air Transport Flight, September 1964**

Another RAE Air Transport Flight machine, VP975 featured a Roundel Blue fuselage with white upper decking, dorsal strake and fin and rudder. The wings and tailplanes had Roundel Blue upper surfaces with Light Aircraft Grey under surfaces – as did the engine nacelles. Fuselage cheatlines were Golden Yellow edged in white and there was a small black anti-glare panel. National markings on the fuselage and wing upper surfaces were thinly outlined in white. The RAE crest was applied below cockpit on white panel (see enlargement), and the RAE titles above the cabin windows were in black in a serif typeface. The propeller spinners were also Roundel Blue. (see photo opposite)

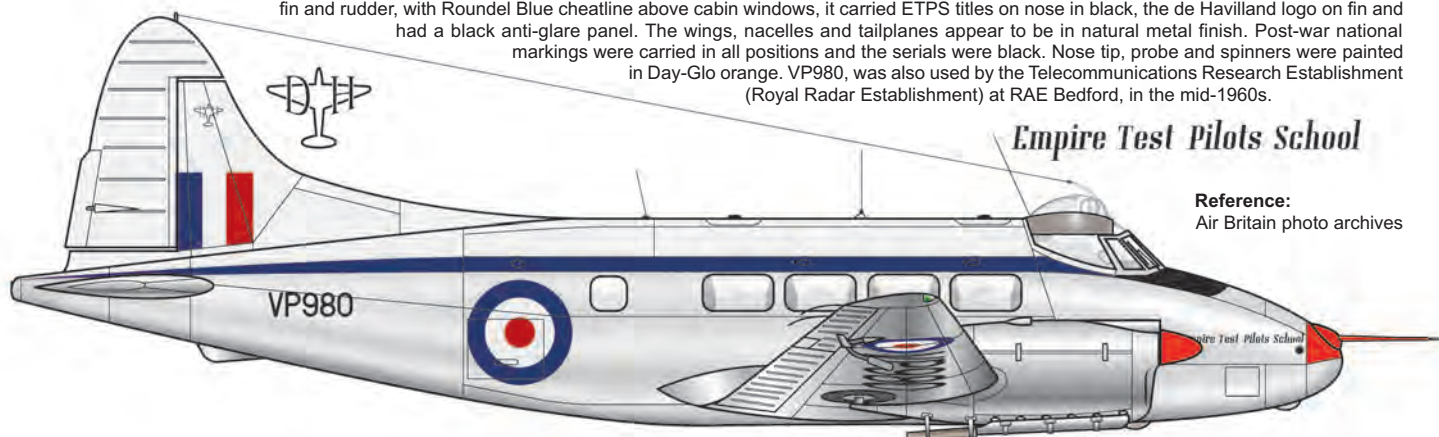
Reference: Air Britain photo archives

**De Havilland DH 104 Devon C.1, VP980, Empire Test Pilots School, RAE Boscombe Down, September 1964**

The ETPS operated VP980 in the ferrying and transport role in the early 1960s. Finished in an overall silver scheme with white upper fuselage decking, fin and rudder, with Roundel Blue cheatline above cabin windows, it carried ETPS titles on nose in black, the de Havilland logo on fin and had a black anti-glare panel. The wings, nacelles and tailplanes appear to be in natural metal finish. Post-war national markings were carried in all positions and the serials were black. Nose tip, probe and spinners were painted in Day-Glo orange. VP980, was also used by the Telecommunications Research Establishment (Royal Radar Establishment) at RAE Bedford, in the mid-1960s.

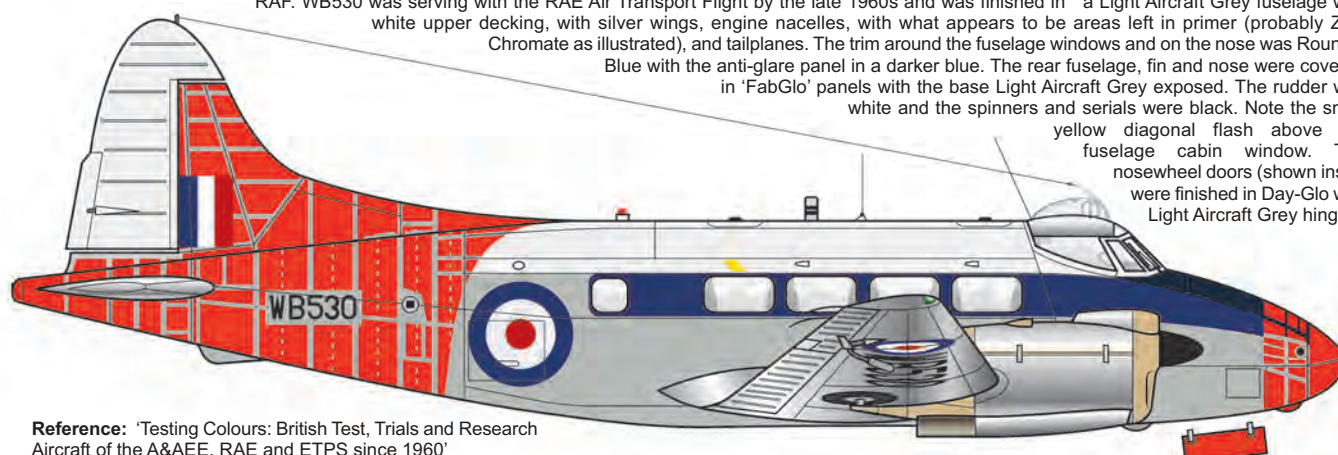
Empire Test Pilots School

Reference:
Air Britain photo archives

**De Havilland DH 104 Devon C.2, WB530, RAE Bedford, April 1968**

The Devon C.2 was a re-engined transport and communications version of the C.1, of which some forty or so were originally produced for the RAF. WB530 was serving with the RAE Air Transport Flight by the late 1960s and was finished in a Light Aircraft Grey fuselage with white upper decking, with silver wings, engine nacelles, with what appears to be areas left in primer (probably Zinc Chromate as illustrated), and tailplanes. The trim around the fuselage windows and on the nose was Roundel Blue with the anti-glare panel in a darker blue. The rear fuselage, fin and nose were covered in 'FabGlo' panels with the base Light Aircraft Grey exposed. The rudder was white and the spinners and serials were black. Note the small yellow diagonal flash above the fuselage cabin window. The nosewheel doors (shown inset) were finished in Day-Glo with Light Aircraft Grey hinges.

Reference: 'Testing Colours: British Test, Trials and Research Aircraft of the A&AEE, RAE and ETPS since 1960'





Above: Avro Lincoln B.2, RF533, seen at the Stansted Fire School on 29 October 1962 following its career with the Ministry of Supply who had undertaken numerous and varied research tasks using this airframe since 1948. RF533 later succumbed to fire.

Avro Lincoln B.2, RF533, Stansted Fire School, June 1961

RF533 is shown here as it appeared shortly after arriving at the Stansted Fire School, having reached the end of its useful life, and looking decidedly the worse for wear. Originally finished in the standard post-war Bomber Scheme of Medium Sea Grey upper surfaces with Anti-Searchlight Glossy Black side and under surfaces to pattern No 2, with red fuselage serials and white underwing serials, the Day-Glo nose cone, front and rear fuselage sections, fins and wing tips.sections, had faded to an orange-yellow hue. RF533 was destroyed by fire shortly afterwards.

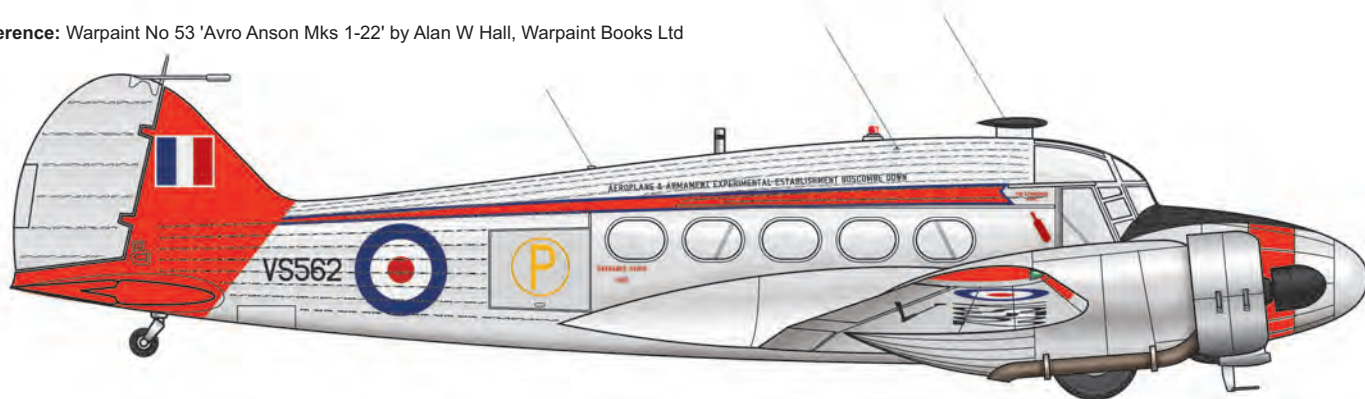
Reference: 'Farnborough - 100 Years of British Aviation' by Peter J Cooper, Midland Publishing Ltd



Avro Anson T.21, VS562, Aeroplane & Armament Experimental Establishment, Boscombe Down, 1962

VS562 was the prototype T.21 aircraft and was operated at a number of test and experimental establishments during its working life. When it was serving with the A&AEE at Boscombe Down in 1962 it carried an overall painted aluminium finish, with white fuselage upper decking. Day-Glo/'FabGlo' areas were applied to the nose and fin/rear fuselage. The cheatline is Day-Glo with Roundel Blue edging. Note the yellow prototype 'P' marking retained on the fuselage sides. Serials, spinners and anti-glare panel were all in black.

Reference: Warpaint No 53 'Avro Anson Mk 1-22' by Alan W Hall, Warpaint Books Ltd



Below: Avro Anson T.21, VS562, as used by the A&AEE circa 1962. VS562 was the prototype T.21 Anson and was operated by several experimental establishments during its working life. Delivered in 1948, VS562's military flying career lasted until 9 April 1965 when it became maintenance airframe 8012M and still existed at Llanbedr as late as 1980.



Handley Page Hastings C.1A, TG618, Meteorological Research Flight, RAE Farnborough, August 1963

TG618 was one of a batch of 100 Hastings C.1s built by Handley Page at Radlett and delivered to the RAF between November 1947 and February 1950, some of which were converted to Met 1 and T.5 configuration. Finished in the standard overall aluminium/natural metal finish with white fuselage upper surfaces divided by a Roundel Blue cheatline, black serials and anti-glare panel, TG618's nacelles, cowlings, wings, tailplanes and radar pod were painted in aluminium – the radar pod having a black tip. There were Day-Glo sections on the fin, wing and tailplane tips, and the spinners were painted in Day-Glo too. The RAE crest was carried below and slightly to rear of cockpit (see inset), and the

Meteorological Research Flight titling was applied in black above the fuselage cabin windows. TG618 was Struck Off Charge at the end of June 1968.

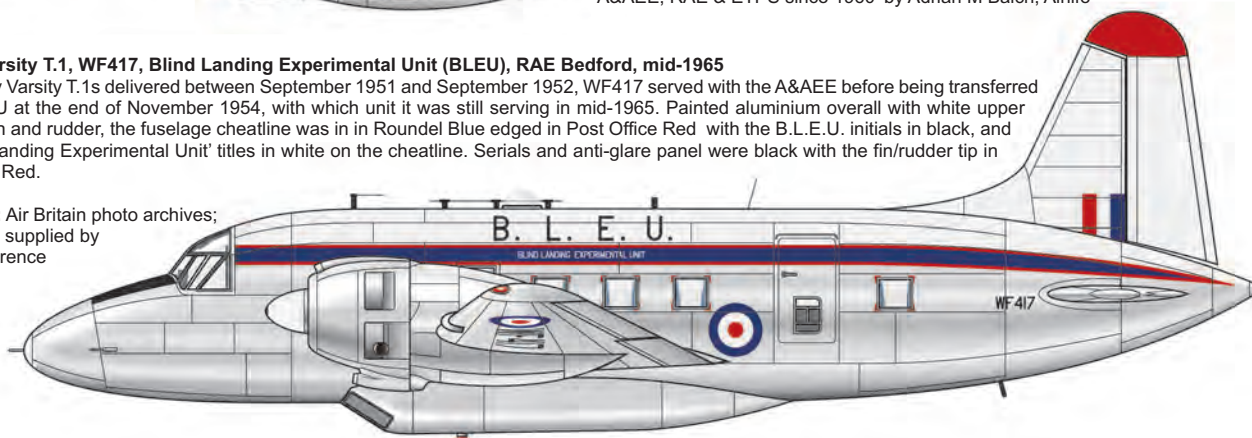


Reference: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife

Vickers Varsity T.1, WF417, Blind Landing Experimental Unit (BLEU), RAE Bedford, mid-1965

One of sixty Varsity T.1s delivered between September 1951 and September 1952, WF417 served with the A&AEE before being transferred to the BLEU at the end of November 1954, with which unit it was still serving in mid-1965. Painted aluminium overall with white upper fuselage, fin and rudder, the fuselage cheatline was in in Roundel Blue edged in Post Office Red with the B.L.E.U. initials in black, and the 'Blind Landing Experimental Unit' titles in white on the cheatline. Serials and anti-glare panel were black with the fin/rudder tip in Post Office Red.

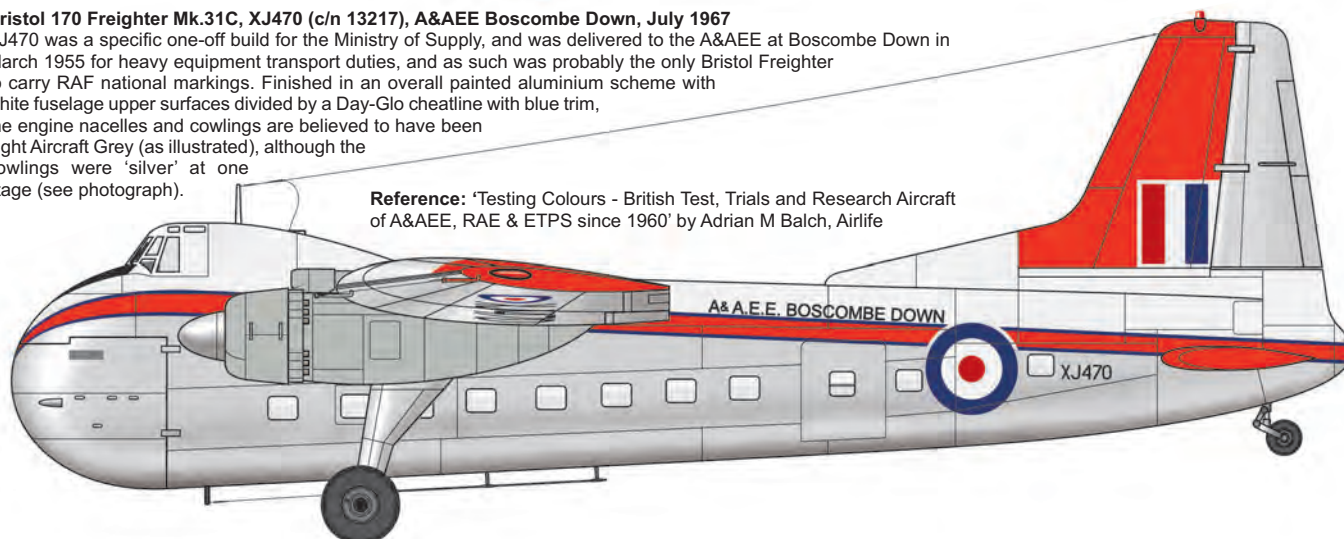
Reference: Air Britain photo archives; photograph supplied by James Lawrence



Bristol 170 Freighter Mk.31C, XJ470 (c/n 13217), A&AEE Boscombe Down, July 1967

XJ470 was a specific one-off build for the Ministry of Supply, and was delivered to the A&AEE at Boscombe Down in March 1955 for heavy equipment transport duties, and as such was probably the only Bristol Freighter to carry RAF national markings. Finished in an overall painted aluminium scheme with white fuselage upper surfaces divided by a Day-Glo cheatline with blue trim, the engine nacelles and cowlings are believed to have been Light Aircraft Grey (as illustrated), although the cowlings were 'silver' at one stage (see photograph).

Reference: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife



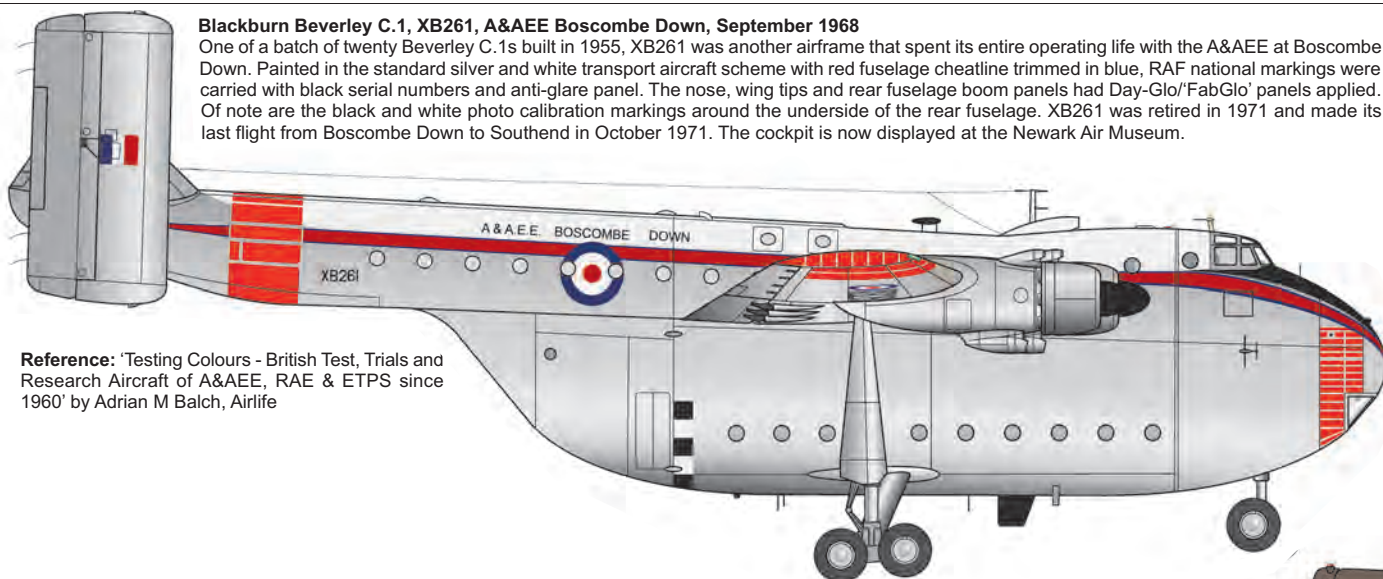
Below: Seen circa 1966/67, Bristol Freighter XJ470 was used by the A&AEE to transport equipment around Europe as required. Delivered in early 1955, XJ470 spent all its life with the A&AEE until retired in July 1968 – it was broken up the following year.



Blackburn Beverley C.1, XB261, A&AEE Boscombe Down, September 1968

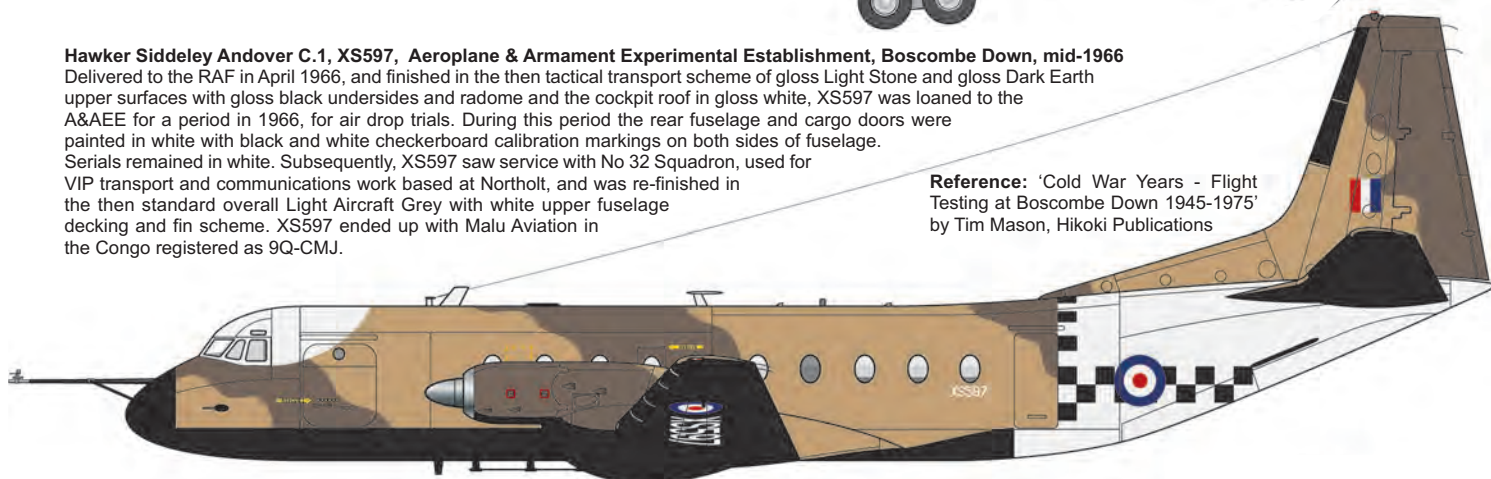
One of a batch of twenty Beverley C.1s built in 1955, XB261 was another airframe that spent its entire operating life with the A&AEE at Boscombe Down. Painted in the standard silver and white transport aircraft scheme with red fuselage cheatline trimmed in blue, RAF national markings were carried with black serial numbers and anti-glare panel. The nose, wing tips and rear fuselage boom panels had Day-Glo/FabGlo panels applied. Of note are the black and white photo calibration markings around the underside of the rear fuselage. XB261 was retired in 1971 and made its last flight from Boscombe Down to Southend in October 1971. The cockpit is now displayed at the Newark Air Museum.

Reference: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife

**Hawker Siddeley Andover C.1, XS597, Aeroplane & Armament Experimental Establishment, Boscombe Down, mid-1966**

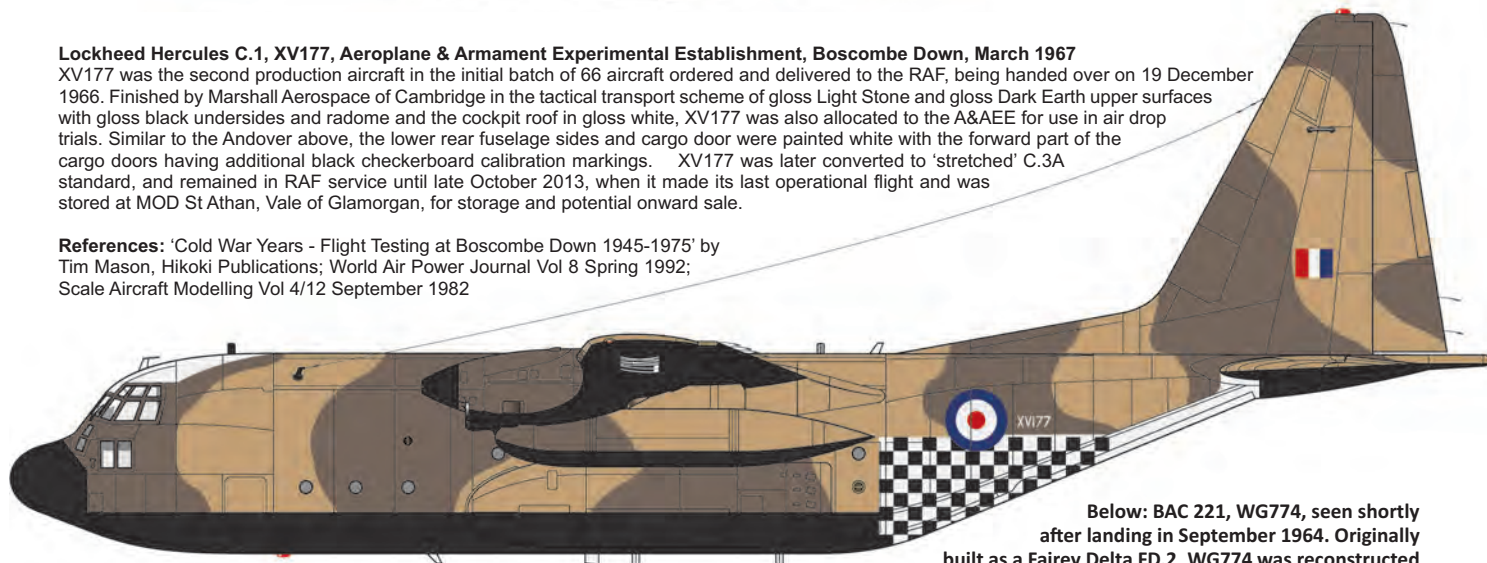
Delivered to the RAF in April 1966, and finished in the then tactical transport scheme of gloss Light Stone and gloss Dark Earth upper surfaces with gloss black undersides and radome and the cockpit roof in gloss white, XS597 was loaned to the A&AEE for a period in 1966, for air drop trials. During this period the rear fuselage and cargo doors were painted in white with black and white checkerboard calibration markings on both sides of fuselage. Serials remained in white. Subsequently, XS597 saw service with No 32 Squadron, used for VIP transport and communications work based at Northolt, and was re-finished in the then standard overall Light Aircraft Grey with white upper fuselage decking and fin scheme. XS597 ended up with Malu Aviation in the Congo registered as 9Q-CMJ.

Reference: 'Cold War Years - Flight Testing at Boscombe Down 1945-1975' by Tim Mason, Hikoki Publications

**Lockheed Hercules C.1, XV177, Aeroplane & Armament Experimental Establishment, Boscombe Down, March 1967**

XV177 was the second production aircraft in the initial batch of 66 aircraft ordered and delivered to the RAF, being handed over on 19 December 1966. Finished by Marshall Aerospace of Cambridge in the tactical transport scheme of gloss Light Stone and gloss Dark Earth upper surfaces with gloss black undersides and radome and the cockpit roof in gloss white, XV177 was also allocated to the A&AEE for use in air drop trials. Similar to the Andover above, the lower rear fuselage sides and cargo door were painted white with the forward part of the cargo doors having additional black checkerboard calibration markings. XV177 was later converted to 'stretched' C.3A standard, and remained in RAF service until late October 2013, when it made its last operational flight and was stored at MOD St Athan, Vale of Glamorgan, for storage and potential onward sale.

References: 'Cold War Years - Flight Testing at Boscombe Down 1945-1975' by Tim Mason, Hikoki Publications; World Air Power Journal Vol 8 Spring 1992; Scale Aircraft Modelling Vol 4/12 September 1982

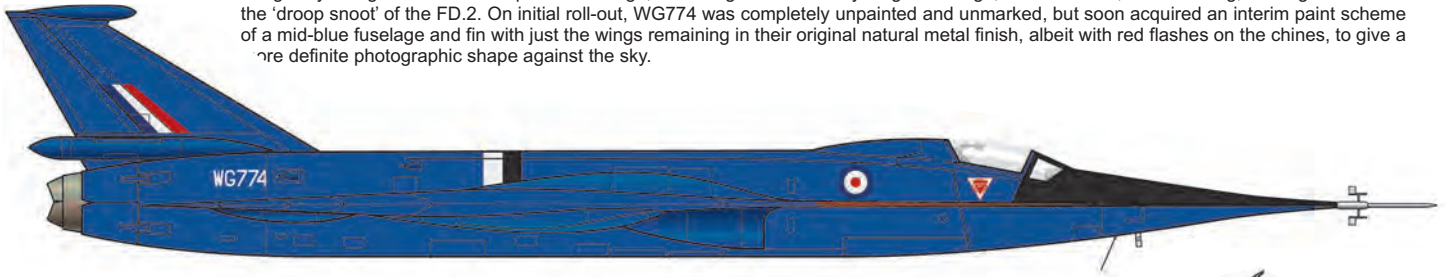


Below: BAC 221, WG774, seen shortly after landing in September 1964. Originally built as a Fairey Delta FD.2, WG774 was reconstructed in 1960 to the form seen here. (See 4-view opposite)



BAC 221, WG774, SBAC show at Farnborough, 1966

Fairey's FD.2 WG774 (see also p31), was heavily modified by BAC (who by then owned Fairey) to test the new 'ogive' wing planform type envisaged to be used on the new BAC/Aerospatiale Concorde supersonic airliner, and re-named BAC 221. The resultant aircraft was only marginally recognisable from the previous design, exhibiting a considerably longer fuselage, and of course, the new wing, although it retained the 'droop snoot' of the FD.2. On initial roll-out, WG774 was completely unpainted and unmarked, but soon acquired an interim paint scheme of a mid-blue fuselage and fin with just the wings remaining in their original natural metal finish, albeit with red flashes on the chines, to give a more definite photographic shape against the sky.



First taking to the skies on 1 May 1964, with Chief Test Pilot Godfrey Auty at the controls and accompanied by a Hawker Hunter chase 'plane, development work on the Concorde was already moving on apace, and WG774's intended role became somewhat superfluous. The aircraft did however offer promise as a general test aircraft into the general behaviour of slender delta wings, in partnership with the HP.115 at RAE Bedford, and also approach and landing systems/techniques to be used on the Concorde.



The interim overall natural metal finish with dark blue fuselage and fin soon gave way to an overall dark blue scheme, as illustrated here, in which it made two appearances at the SBAC show at Farnborough, in 1964 and 1966. By this time, WG774 had been fitted with a redesigned plexiglass canopy to improve vision. WG774 soldiered on until June 1973, undertaking various wing test duties, when it was finally retired, and sent to the Royal Scottish Museum, East Fortune in November 1974, being relocated to the Fleet Air Arm Museum at Yeovilton, in 1980, where it remains today.

References: Wings of Fame Vol 11 'Beyond the Frontiers: Fairey Deltas FD.1, FD.2 and BAC 221' by Jon Lake; 'British Prototype Aircraft' by Ray Sturtivant, Haynes Publishing Group

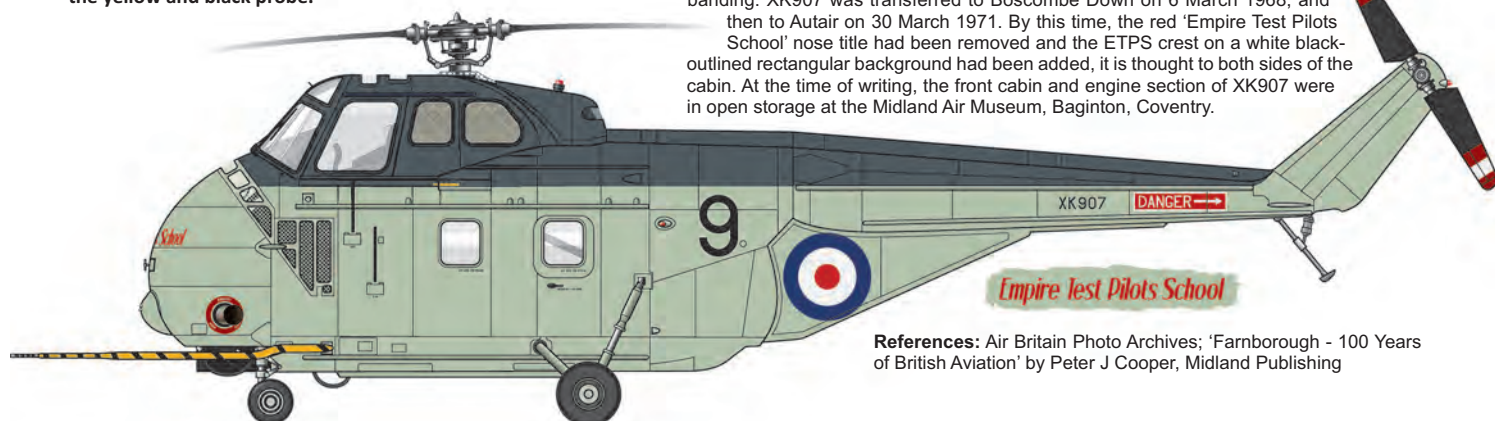




Above: First flown on 25 May 1957 and photographed at Wyton on 14 September 1963 is Westland Whirlwind HAS.7, XK907 '9', one of a batch intended for the RN but in this instance delivered instead to No.2 Rotary Wing, Empire Test Pilots School, Farnborough. At this time 'Empire Test Pilots School' was written in full across XK907's nose with the last two words visible in this image above the yellow and black probe.

Westland Whirlwind HAS.7, XK907/9, No 2 Rotary Wing, Empire Test Pilots School, RAE Farnborough, September 1963

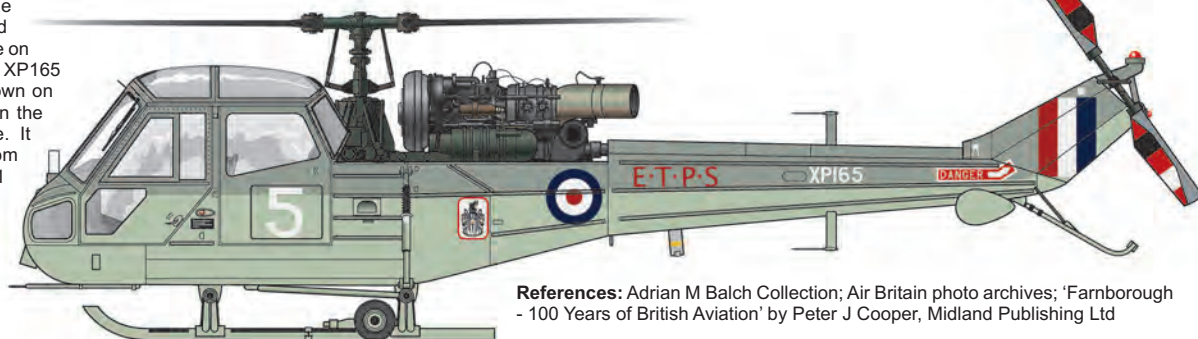
Built and delivered to the Royal Navy's Fleet Air Arm in May 1957, XK907 had been transferred to the Empire Test Pilots School, No 2 Rotary Wing, at RAE Farnborough, by September 1963. Finished in overall Sky with Extra Dark Sea Grey upper surfaces, serials and the numeral '9' were in black. The 'Empire Test Pilots School' title was carried on the nose in red (see inset). The nose probe was yellow with black banding. XK907 was transferred to Boscombe Down on 6 March 1968, and then to Autair on 30 March 1971. By this time, the red 'Empire Test Pilots School' nose title had been removed and the ETPS crest on a white black-outlined rectangular background had been added, it is thought to both sides of the cabin. At the time of writing, the front cabin and engine section of XK907 were in open storage at the Midland Air Museum, Baginton, Coventry.



References: Air Britain Photo Archives; 'Farnborough - 100 Years of British Aviation' by Peter J Cooper, Midland Publishing

Westland Scout AH Mk 1, XP165/5, Rotary Wing Test Squadron, Empire Test Pilots School, RAE Farnborough, September 1966

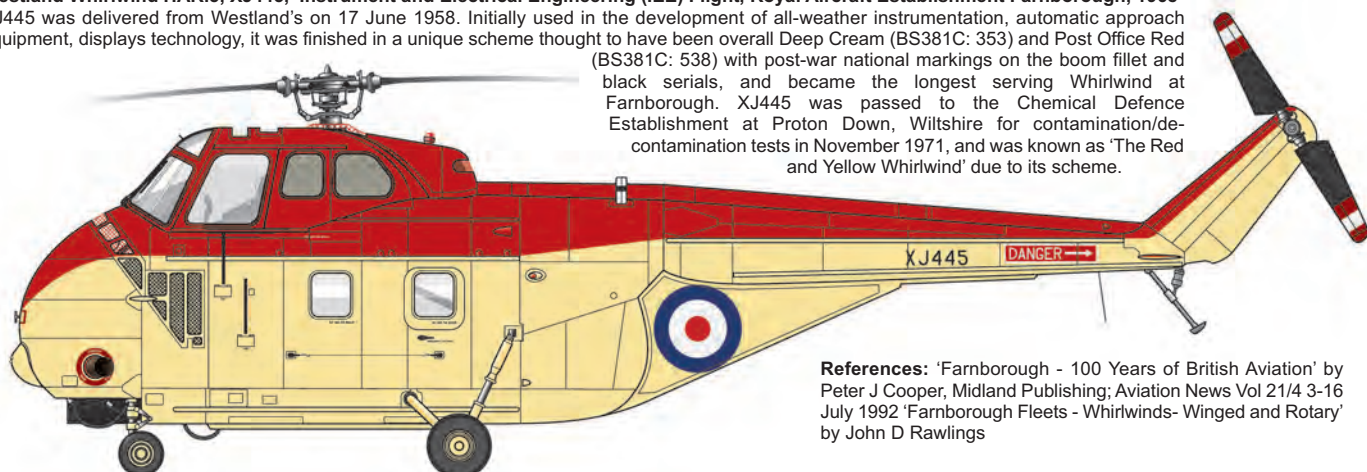
XP165 was the first Scout AH.1 to be built and served with Fairey, Westlands and Blackburn before it went to Farnborough on 21 April 1964. Finished in overall Sky with Light Grey (BS381C: 631) upper surfaces, the serials and numeral '5' were in white, with the 'ETPS' title in red on the boom sides and the ETPS crest on a red outlined white rectangle on the engine bay sides. XP165 went to Boscombe Down on 24 January 1968 when the ETPS relocated there. It was withdrawn from service in June 1971 and is now an exhibit at the Helicopter Museum, Weston-Super-Mare.



References: Adrian M Balch Collection; Air Britain photo archives; 'Farnborough - 100 Years of British Aviation' by Peter J Cooper, Midland Publishing Ltd

Westland Whirlwind HAR.5, XJ445, Instrument and Electrical Engineering (IEE) Flight, Royal Aircraft Establishment Farnborough, 1968

XJ445 was delivered from Westland's on 17 June 1958. Initially used in the development of all-weather instrumentation, automatic approach equipment, displays technology, it was finished in a unique scheme thought to have been overall Deep Cream (BS381C: 353) and Post Office Red (BS381C: 538) with post-war national markings on the boom fillet and black serials, and became the longest serving Whirlwind at Farnborough. XJ445 was passed to the Chemical Defence Establishment at Proton Down, Wiltshire for contamination/decontamination tests in November 1971, and was known as 'The Red and Yellow Whirlwind' due to its scheme.



References: 'Farnborough - 100 Years of British Aviation' by Peter J Cooper, Midland Publishing; Aviation News Vol 21/4 3-16 July 1992 'Farnborough Fleets - Whirlwinds - Winged and Rotary' by John D Rawlings

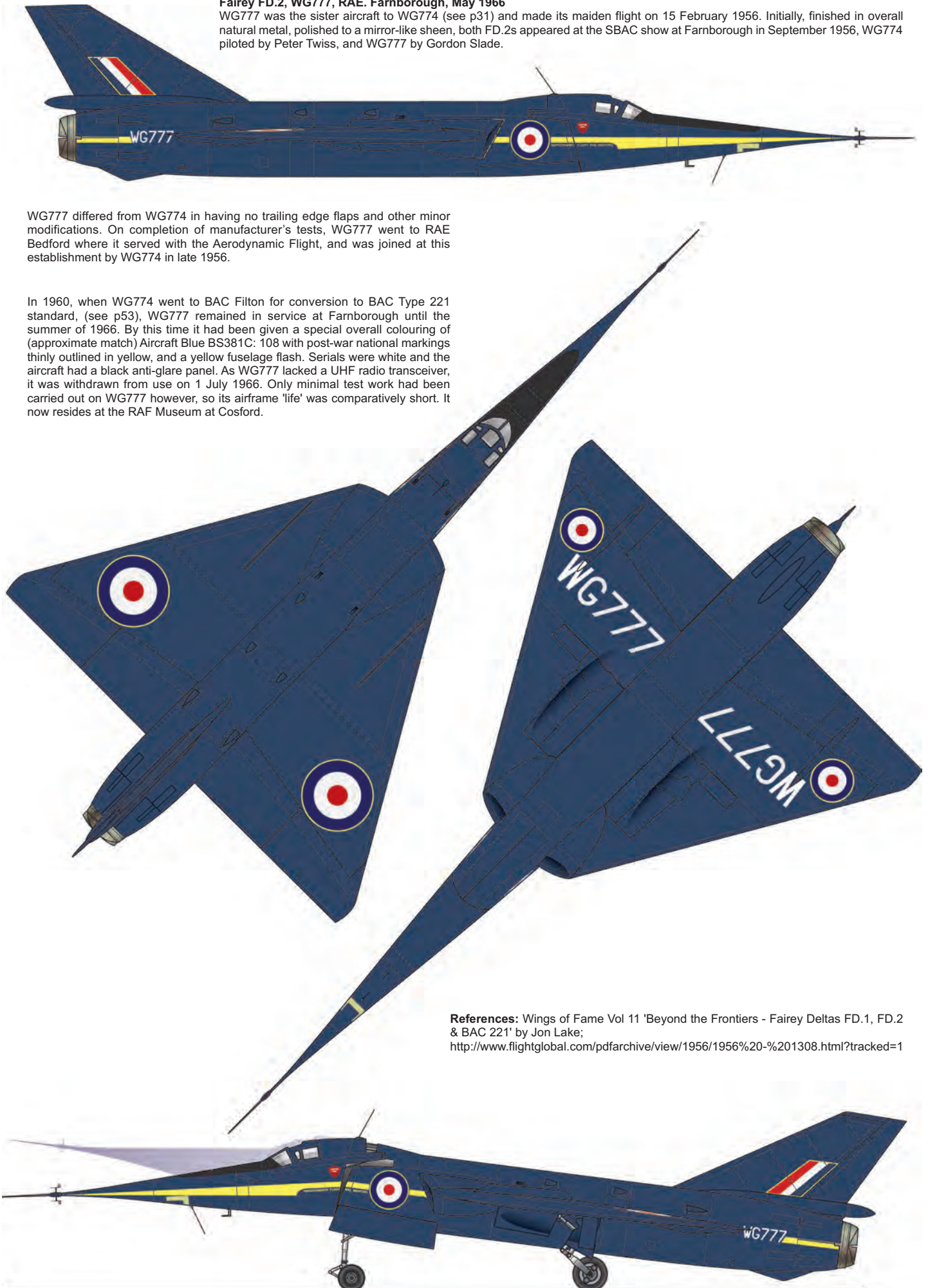
Fairey FD.2, WG777, RAE. Farnborough, May 1966

WG777 was the sister aircraft to WG774 (see p31) and made its maiden flight on 15 February 1956. Initially, finished in overall natural metal, polished to a mirror-like sheen, both FD.2s appeared at the SBAC show at Farnborough in September 1956, WG774 piloted by Peter Twiss, and WG777 by Gordon Slade.

WG777 differed from WG774 in having no trailing edge flaps and other minor modifications. On completion of manufacturer's tests, WG777 went to RAE Bedford where it served with the Aerodynamic Flight, and was joined at this establishment by WG774 in late 1956.

In 1960, when WG774 went to BAC Filton for conversion to BAC Type 221 standard, (see p53), WG777 remained in service at Farnborough until the summer of 1966. By this time it had been given a special overall colouring of (approximate match) Aircraft Blue BS381C: 108 with post-war national markings thinly outlined in yellow, and a yellow fuselage flash. Serials were white and the aircraft had a black anti-glare panel. As WG777 lacked a UHF radio transceiver, it was withdrawn from use on 1 July 1966. Only minimal test work had been carried out on WG777 however, so its airframe 'life' was comparatively short. It now resides at the RAF Museum at Cosford.

References: Wings of Fame Vol 11 'Beyond the Frontiers - Fairey Deltas FD.1, FD.2 & BAC 221' by Jon Lake;
<http://www.flightglobal.com/pdfarchive/view/1956/1956%20-%201308.html?tracked=1>



Chapter 4: The 1970s



The onset of the 1970s continued very much the trend of the later 1960s, with reduced aircraft fleets at both Farnborough and Boscombe Down compared to the 1950s, and more problems for some of Britain's aircraft companies. The very high-profile financial difficulties that the famous engine company Rolls-Royce found itself in was one of a number of problems that plagued the wider aircraft industry during the decade, as comparatively reduced defence spending and the requirement for fewer front-line aircraft types continued to have a detrimental effect on the military infrastructure as well. Fortunately Rolls-Royce was saved, and continues to exist as one of the world's premier engine designers and manufacturers.

However, defence cuts instituted by the Labour Government of the mid-1970s, which were not reversed by the incoming Conservative administration at the end of the decade, which led to the abandonment of a conventional aircraft carrier-based Fleet Air Arm. During 1977 much of what was left of Britain's aircraft manufacturers was nationalised under the umbrella of a new entity named British Aerospace. This left only a small number of independent British companies, such as Westland Helicopters at Yeovil in Somerset. Westlands fortunately continued to be success story, and had become involved in useful foreign collaboration with France during the 1960s that

led to such projects as the Puma and Lynx helicopters – each of which has proven to be highly successful in military service.

Another significant collaborative programme, that is still with us today, gained momentum during the early 1970s – the MRCA or Multi-Role Combat Aircraft project, which eventually came to fruition as the Tornado. An international grouping named Panavia was formed in 1969 to oversee and create the multi-national programme, which included participation from Italy and West Germany as well as Britain. A very considerable amount of flight testing of the Tornado took place in all of the Panavia member countries, reflecting the fact that there were different versions of the type for strike and fighter roles, and each country was interested in a slightly different standard with various avionics installations, weapons capabilities and many other detail changes. The Tornado proved to be a highly successful combat aircraft, and is still undertaking front-line combat missions at the time of writing.

In the early part of the 1970s, the Ministry of Defence (MoD) in the form that is familiar to us today was first created. This had a considerable bearing on military aircraft procurement for the British armed forces, and therefore also for official flight testing

Continued on page 59

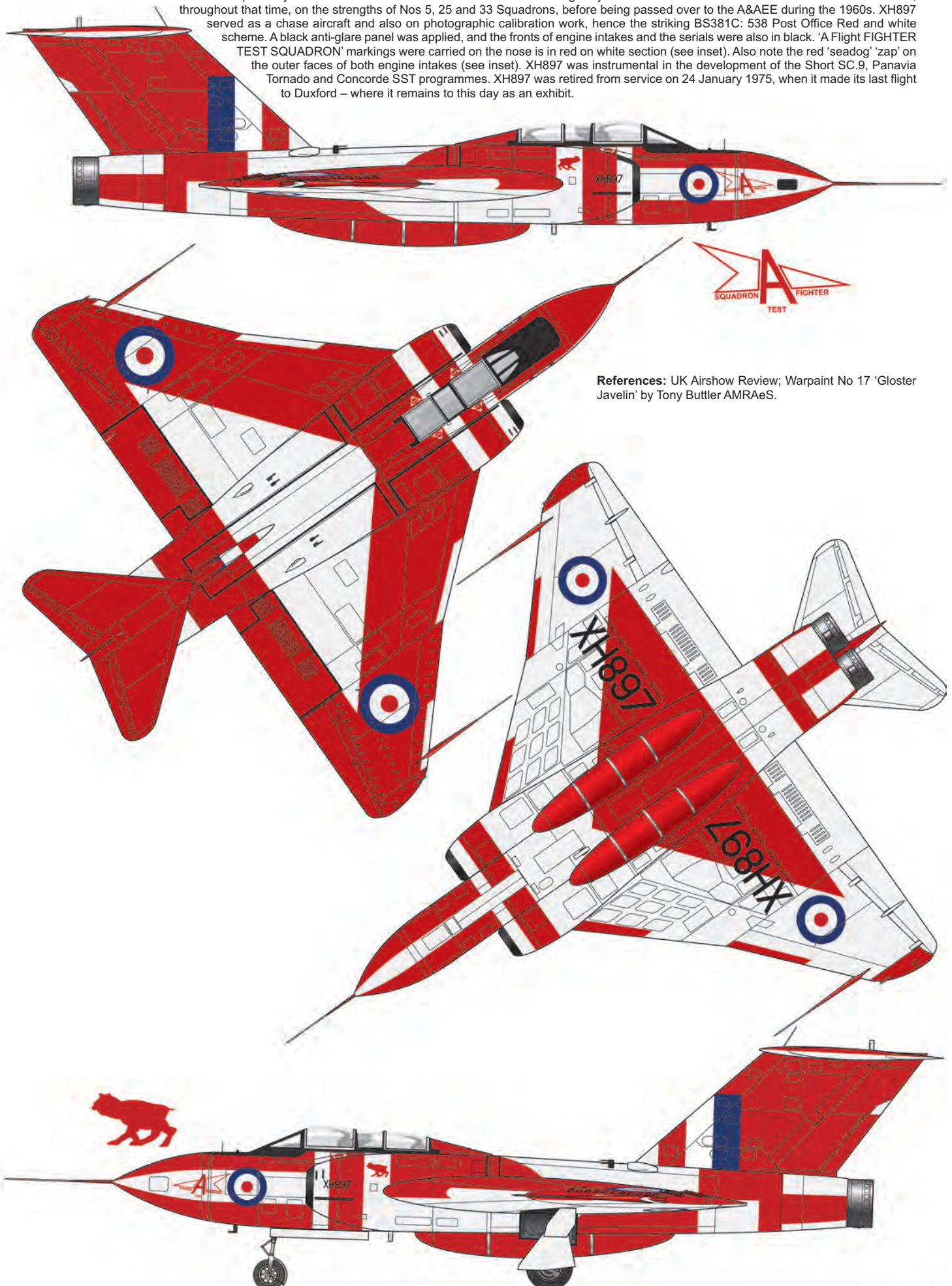


Above and Left: Gloster Javelin FAW.9, XH897, A&AEE Boscombe Down, seen in August 1968 at RAF Coltishall just weeks after receiving this outstanding colour scheme for its duties as a chase aircraft and for photographic calibration work. Whilst Javelin XA778's days were by now numbered, XH897 would continue to fly for almost seven more years – the last of the breed to do so.

Fred Martin Collection

(See 4-view opposite)

Gloster Javelin FAW.9, XH897, 'A' Flight, Aircraft & Armament Experimental Establishment (A&AEE) Boscombe Down, August 1970
 This aircraft is probably the best known of all the test Javelins and was originally built as an FAW.7. It saw service with the RAF and was, throughout that time, on the strengths of Nos 5, 25 and 33 Squadrons, before being passed over to the A&AEE during the 1960s. XH897 served as a chase aircraft and also on photographic calibration work, hence the striking BS381C: 538 Post Office Red and white scheme. A black anti-glare panel was applied, and the fronts of engine intakes and the serials were also in black. 'A Flight FIGHTER TEST SQUADRON' markings were carried on the nose in red on white section (see inset). Also note the red 'seadog' 'zap' on the outer faces of both engine intakes (see inset). XH897 was instrumental in the development of the Short SC.9, Panavia Tornado and Concorde SST programmes. XH897 was retired from service on 24 January 1975, when it made its last flight to Duxford – where it remains to this day as an exhibit.



References: UK Airshow Review; Warpaint No 17 'Gloster Javelin' by Tony Buttler AMRAeS.

Hawker Hunter F.6 (P.1109B), WW598, Royal Aircraft Establishment Llandbedr, early 1970s

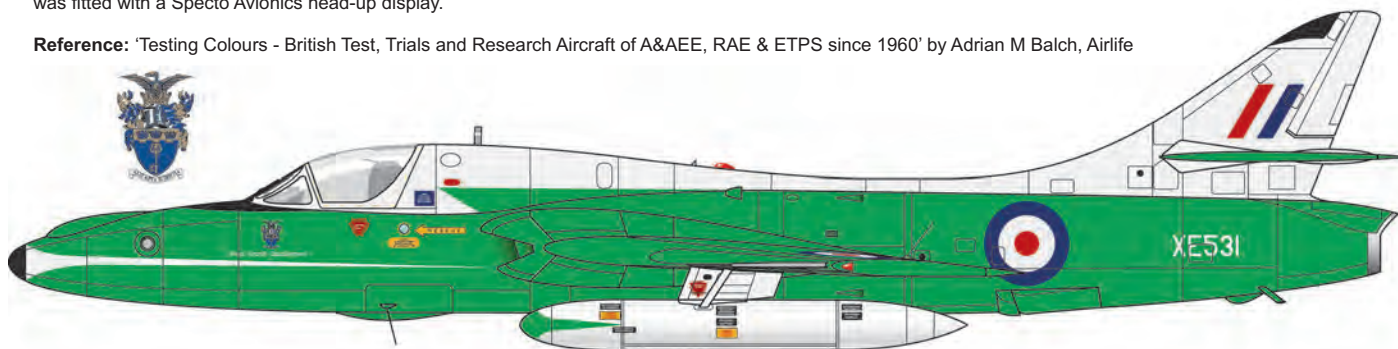
WW598 again, (see pp35 and 46), this time finished in an overall white scheme with Roundel Blue spine, fin, fuselage flash and tank upper surfaces. It also appears that the anti-glare panel was the same dark blue shade. Serials and 'Royal Aircraft Establishment' titles were in black. Note the red Welsh Dragon motif on the nose (inset). The nose bulge housed a camera. At this time WW598 was used as a chase aircraft for Llanbedr-based target drones, but went back to Hawker Siddeley Aviation in May 1974 and was converted to FGA.70A standard and passed on to the Lebanese Air Force,

Reference: 'Hawker Hunter 1951-2007 in UK and Foreign Service' by David J Griffin

**Hawker Hunter T.12, XE531, Instrument & Electrical Engineering (I&EE) Department, Royal Aircraft Establishment, Farnborough, July 1971**

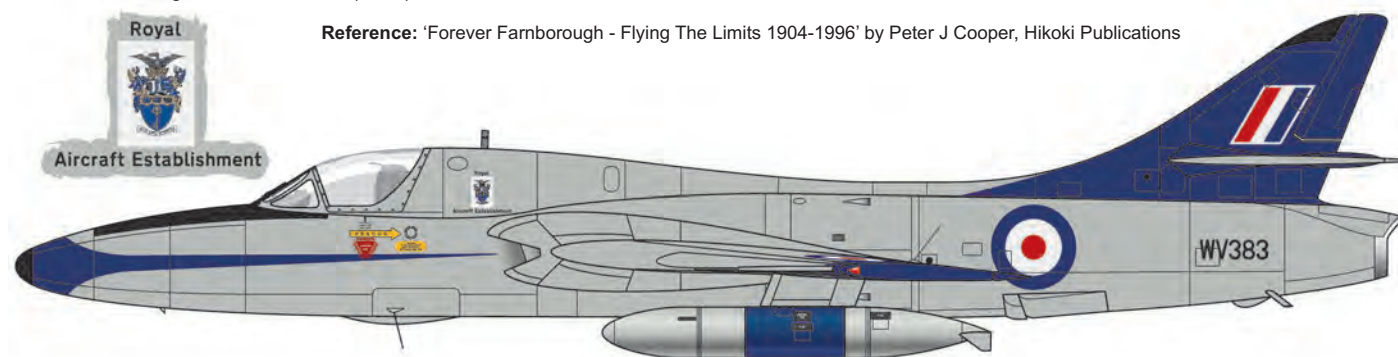
XE531 was built as a single-seat F.6 (with an Avon 203) but converted to FGA.9 spec (and re-fitted with Avon 207), before finally being converted to twin-seat T.12 standard. Finished in a striking overall gloss Ident Green, a special one-off colour which does not appear to have a BS381 code assigned to it, with gloss white spine, fin and rudder, nose fuselage flash and wing tanks/pylons, the serials were white and the anti-glare panel and tip of nose were black. The wing tank flashes were also Ident Green. An RAE crest and title (in white) were carried on the nose (see inset). XE531 later tested fly-by-wire systems from 1973, retaining the same scheme and was fitted with a Specto Avionics head-up display.

Reference: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife

**Hawker Hunter T.7, WV383, Flight Systems Department (FSD) RAE Farnborough, August 1974**

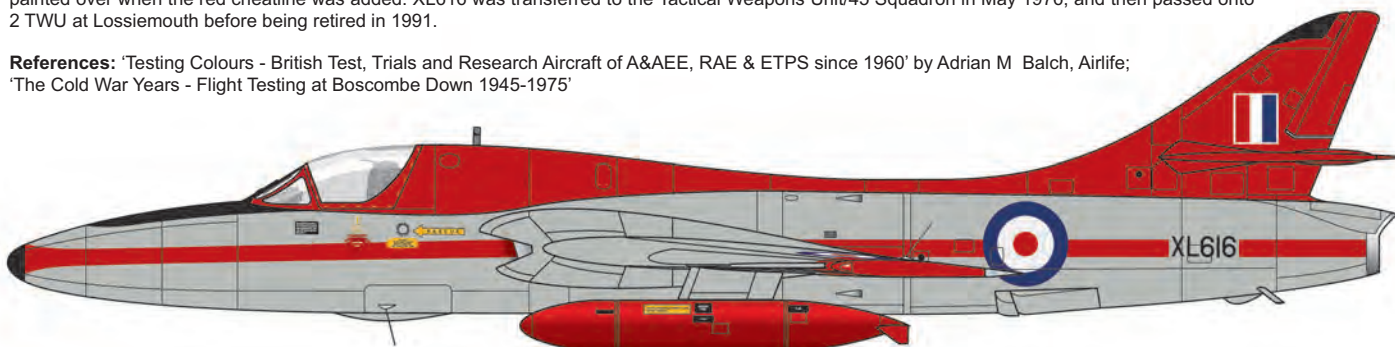
WV383 was originally built as an F.4, before conversion to T.7 standard in 1956, and served with Nos 4, 20, 28 and 79 Squadrons before being passed to RAE Farnborough in 1971. Finished in an overall Light Aircraft Grey scheme with Roundel Blue fin/rudder, wing tips, nose flash and drop tank bands, the serials, nose tip and anti-glare panel were all in black. An RAE crest on white rectangular background was applied to the rear of the cockpit (see inset), and the RAE titling was in black. After its service at Farnborough, WV383 went to Cranfield, subsequently being used in the testing of night vision, FLIR (Forward Looking Infra-Red) and on-board camera systems. It was later repainted in the 'Raspberry Ripple' scheme and named 'HECATE - Lady of the Night' and last flew with QinetiQ in 1998. It is now an exhibit at the Farnborough Air Sciences Trust (FAST) Museum.

Reference: 'Forever Farnborough - Flying The Limits 1904-1996' by Peter J Cooper, Hikoki Publications

**Hawker Hunter T.7A, XL616, Empire Test Pilots School, Aircraft & Armament Experimental Establishment (A&AEE) Boscombe Down, mid-1970s**

XL616 was delivered to the ETPS in 1966 as one of three twin-seater Hunters, (the others being XL611 a T.7A and XL612 a T.7), to replace the Meteors then in use. Finished in overall Light Aircraft Grey with Post Office Red fuselage spine, fin and rudder, cheatline down the length of the fuselage, wing tips and drop tanks, the serials and anti-glare panel were in black. An ETPS crest on a Light Aircraft Grey rectangular background was originally carried behind cockpit, but appears to have been painted over when the red cheatline was added. XL616 was transferred to the Tactical Weapons Unit/45 Squadron in May 1976, and then passed onto 2 TWU at Lossiemouth before being retired in 1991.

References: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife;
'The Cold War Years - Flight Testing at Boscombe Down 1945-1975'



Continued from page 56

as well. The original Ministry of Defence had been created by Act of Parliament in 1946, with the new ministry being headed by a Minister of Defence. In the following few years the Ministry gradually took over more and more control over military-related matters from existing ministries and from the departments of the three services (Navy, Army and Air Force, which were absorbed in 1964). Finally, the defence functions of the Ministry of Aviation Supply as it was then known were taken over by the MoD in 1971, creating the entity that in roughly the same form has continued to exist in to the new century. By that step the MoD thus took on the responsibility for supplying military aircraft and guided weapons for the British armed forces.

In previous times much of this responsibility had rested with the Air Ministry of the 1930s, but was transferred early in World War Two to the Ministry of Aircraft Production (and from 1946 the

Ministry of Supply). This procurement responsibility passed to the Ministry of Aviation in 1959, to the Ministry of Technology in 1967, and thence to the Ministry of Aviation Supply in 1970 before the whole process was absorbed into the MoD itself in 1971.

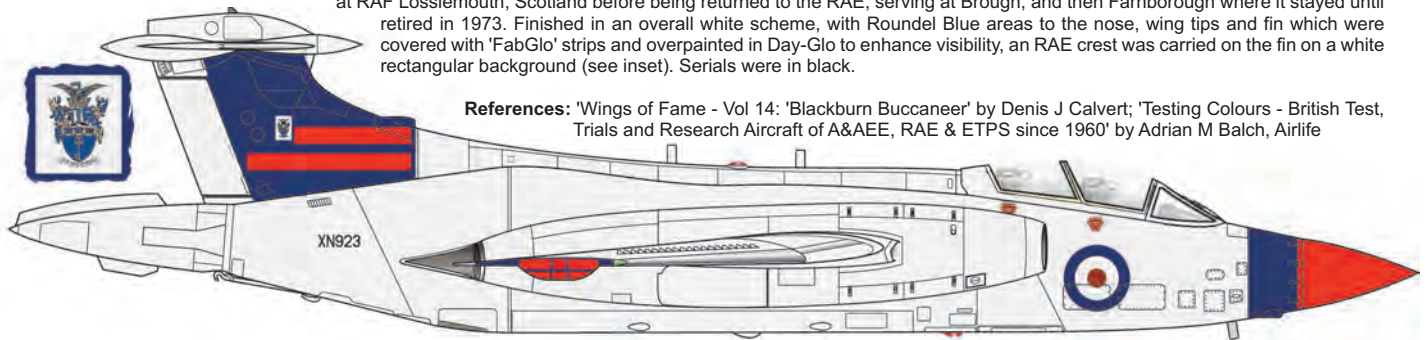
Within the MoD, a Procurement Executive was created in August 1971 to procure aircraft for the armed services, and thence by implication for official testing as well. Since that time, many of the aircraft involved in official test flying tended to be referred to (perhaps rather too loosely in specific cases) as MoD(PE) aircraft, as they were not assigned as front-line combat aircraft or in normal day-to-day operations with any of the services while involved in their test flying activities, but they nonetheless normally remained as military aircraft. (In 1999, the Procurement Executive became an Executive Agency within the MoD).

Continued on page 68

Blackburn Buccaneer S.1, XN923, Royal Aircraft Establishment Farnborough, 1970

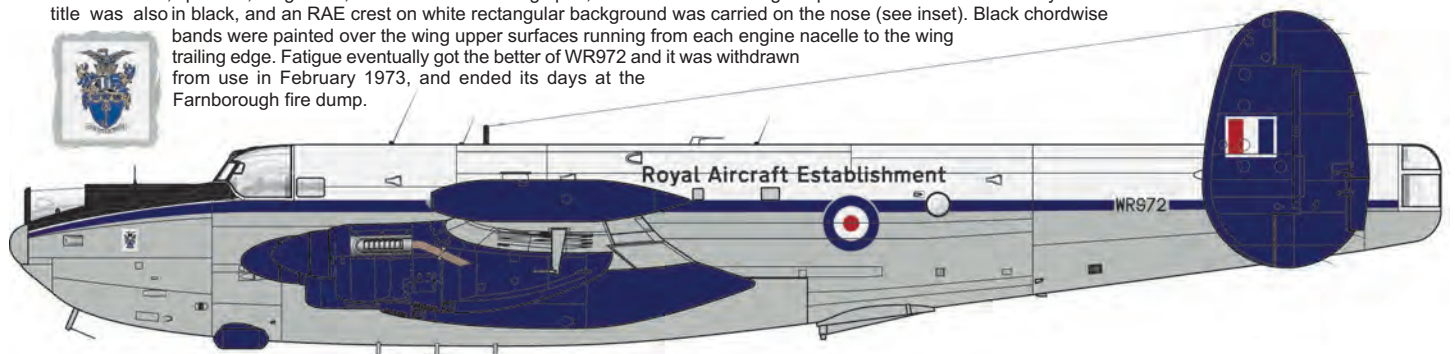
XN923 was the second production Buccaneer S.1 and initially served at RAF West Freugh, Wigtownshire, an armaments training school five miles south east of Stranraer, Scotland, now known as MoD West Freugh and operated by QinetiQ, on behalf of the Ministry of Defence. Following this, it went to No 700Z Flight based at RAF Lossiemouth, Scotland before being returned to the RAE, serving at Brough, and then Farnborough where it stayed until retired in 1973. Finished in an overall white scheme, with Roundel Blue areas to the nose, wing tips and fin which were covered with 'FabGlo' strips and overpainted in Day-Glo to enhance visibility, an RAE crest was carried on the fin on a white rectangular background (see inset). Serials were in black.

References: 'Wings of Fame - Vol 14: 'Blackburn Buccaneer' by Denis J Calvert; 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife



Avro Shackleton MR.3, WR972, Structures and Mechanical Engineering Flight, RAE Farnborough, June 1971

WR972 was used by Avro at Woodford for a variety of test work including airborne lifeboat trials, before going onto the A&AEE at Boscombe Down in late December 1956. It was then passed onto RAE Farnborough in April 1961 where it was used for parachute drag tests and general towing work. It was also used over the Larkhill ranges on Salisbury Plain, on a series of bomblet deployment runs. Finished in an overall Light Aircraft Grey scheme with white fuselage top decking and Roundel Blue cheatline, spinners, wing tanks, fin and forward fuselage pod, the nacelles and anti-glare panel were in black. The 'Royal Aircraft Establishment' title was also in black, and an RAE crest on white rectangular background was carried on the nose (see inset). Black chordwise bands were painted over the wing upper surfaces running from each engine nacelle to the wing trailing edge. Fatigue eventually got the better of WR972 and it was withdrawn from use in February 1973, and ended its days at the Farnborough fire dump.



References: 'Testing Colours - British Test, Trials and Research Aircraft of A & AEE, RAE & ETPS since 1960' by Adrian M Balch; 'Farnborough - 100 Years of British Aviation' by Peter J Cooper, Midland Publishing; 'Shackleton - Guardian of the Sea Lanes' by Richard A Franks, Dalrymple & Verdun; Scale Aircraft Modelling Vol 12/9 June 1990 - Aircraft in Detail- Avro Shackleton by Alan W Hall; <http://avroshackleton.com/marktree.html>

Below: In March or April 1968, Avro Shackleton MR.3, WR972, was repainted to a style which complied with the RAE's standard colour scheme as witnessed by this September 1968 image taken at Coltishall. WR972 was SOC at Farnborough in early 1973 and used for fire practice. [Fred Martin Collection]



English Electric Canberra B.2/8 (hybrid), WJ643, Royal Aircraft Establishment, Farnborough, February 1972

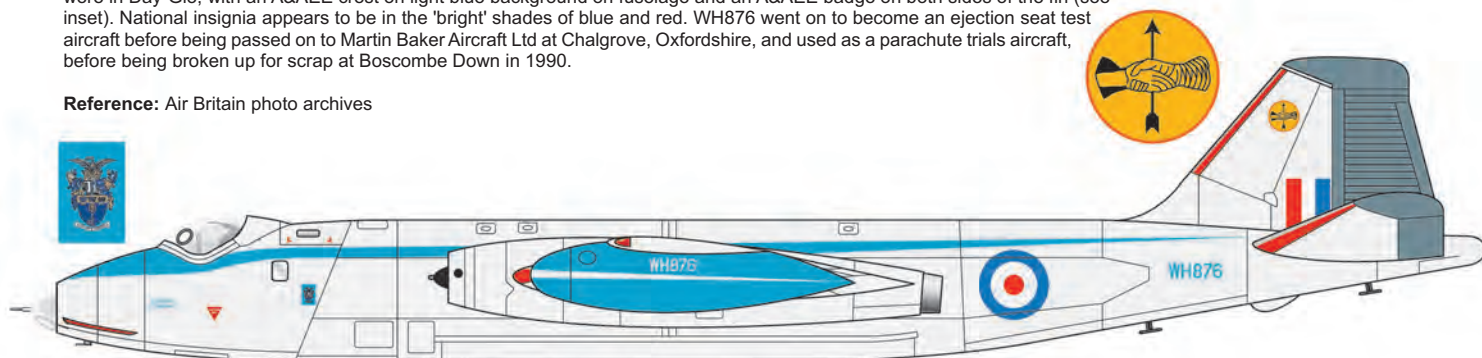
WJ643 arrived at Farnborough on Christmas Eve 1969 after previously being operated from RAF West Freugh, in Wigtownshire, Scotland by the RAE and Ferranti Ltd, in various trials including the development of a laser rangefinder for the Harrier and Jaguar, and nav-attack and aiming systems development. Finished in Dark Sea Grey and Dark Green upper surfaces with gloss black under surfaces, 'FabGlo' panels were applied to the nose and wing tips. The fuselage and underwing serials were white. (see also p72)

Reference: 'Forever Farnborough - Flying the Limits 1904-1996' by Peter J Cooper, Hikoki Publications

**English Electric Canberra B.2, WH876, B Flight, A&AEE Bomber & Maritime Flight Test Squadron, Aeroplane & Armament Experimental Establishment, Boscombe Down, August 1972**

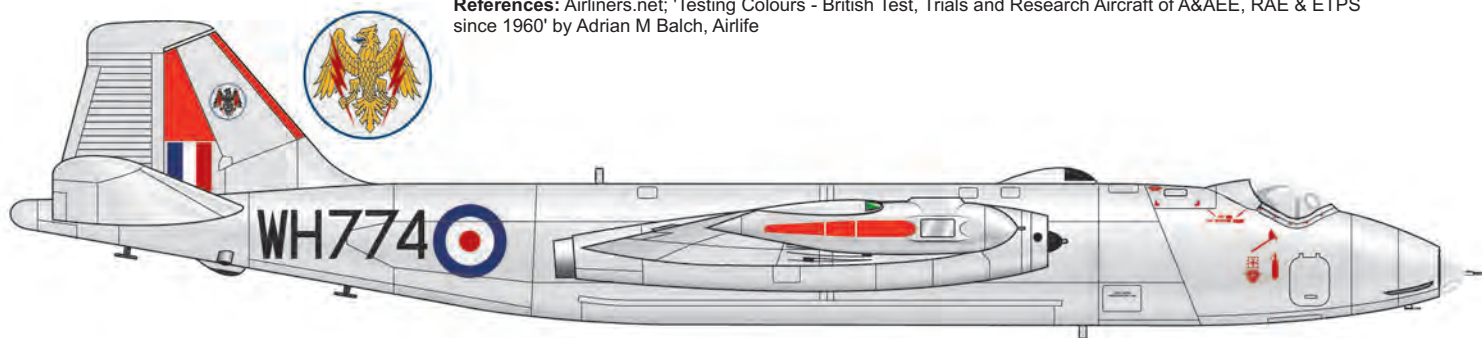
After its regular RAF service, WH876 was converted to U.14 drone standard in 1961 by Short Brothers, Belfast. It was passed onto No 728B NAS at Hal Far, Malta, where it was used as a pilotless aircraft engaged in missile development work. By December 1961, it had returned to the UK, to Pershore in Worcestershire for storage, and was re-converted back to B.2 standard in 1963, when it was passed on to the A&AEE early in 1964. During the early 1970s, WH876 acquired an in-flight refuelling probe, although this was never set up to operate. Finished in an overall white scheme with light blue trim and blue-grey rudder and elevator, the fuselage serials were also in light blue, with those under the wings presumed to be in black. The serial number was repeated on wing tanks in white. The wing, fin and tailplane leading edges were in Day-Glo, with an A&AEE crest on light blue background on fuselage and an A&AEE badge on both sides of the fin (see inset). National insignia appears to be in the 'bright' shades of blue and red. WH876 went on to become an ejection seat test aircraft before being passed on to Martin Baker Aircraft Ltd at Chalgrove, Oxfordshire, and used as a parachute trials aircraft, before being broken up for scrap at Boscombe Down in 1990.

Reference: Air Britain photo archives

**English Electric Canberra PR.7, WH774, Royal Radar Establishment, Pershore, Worcestershire, September 1972**

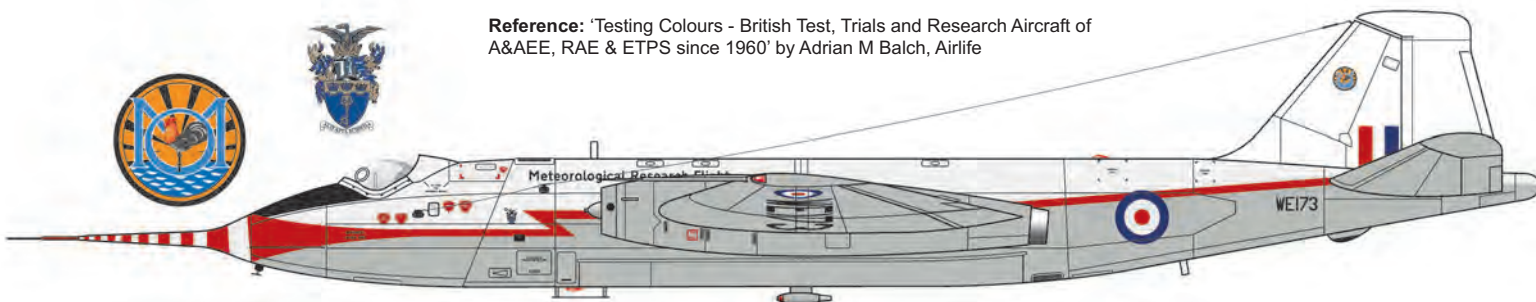
WH774 became operational with the Royal Radar Establishment (RRE) in August 1955 and was heavily involved in radar development and research trials. A number of different systems were fitted, and the aircraft displays a characteristic radar fairing on top of the fuselage and specially modified wing tanks to house further equipment. Finished in overall High Speed Silver, with black serials and Day-Glo trim, an RRE badge was carried on both sides of the fin (see inset). The serial number was repeated on the nosewheel doors. WH774 was later painted in the 'Raspberry Ripple' scheme.

References: Airliners.net; 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife

**English Electric Canberra PR.3, WE173, Meteorological Research Flight, Farnborough, September 1972**

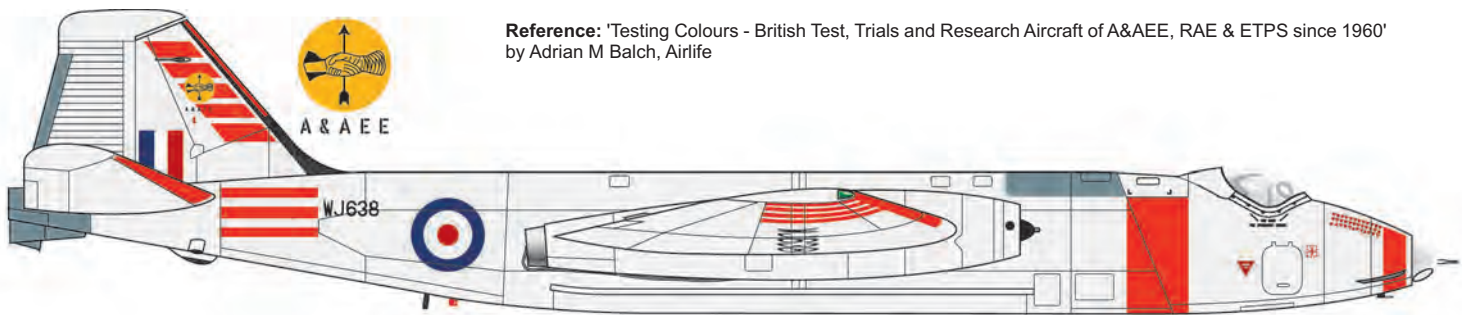
WE173 was originally painted in overall High Speed Silver and delivered to the Meteorological Research Flight (MRF) in 1965. It was repainted in overall Light Aircraft Grey with white fuselage top decking divided by a Signal Red cheatline in 1972 and used in high-altitude stratospheric research work. The serial number and anti-glare panel remained in black. The 'Barber's pole' nose probe was finished in red and white rings and a Meteorological Research Flight badge was carried on both sides of the fin with the RAE crest on the forward fuselage (see insets). WE173 was retired from service on 31 March 1981 and ended up on RAF Coltishall's fire dump.

Reference: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife



English Electric Canberra B.2, WJ638, Aeroplane & Armament Experimental Establishment (A&AEE) Boscombe Down, June 1970

WJ638 was originally modified from a B.2 to U.10 drone configuration and undertook various test work, then, in March 1964, it was delivered to Boscombe Down, where it was reconfigured back to B.2 standard to be used as an ejection seat trials aircraft. The navigator's compartment was altered to accommodate two ejection seats mounted side by side, with cameras on the wings to record the test firings. Finished in an overall white scheme with 'FabGlo' trim on the nose, forward fuselage, wing tips, rear fuselage and fin, the serials were in black. An A&AEE badge was applied to both sides of the fin (see inset). The extreme rear section of fuselage and the rudder trim tab were painted in light blue-grey. Miniature ejection seat test firing symbols were applied to the nose. WJ638 was mainly operated over the Larkhill Ranges in Wiltshire and ended its days at Predannack as a fire rescue hulk.



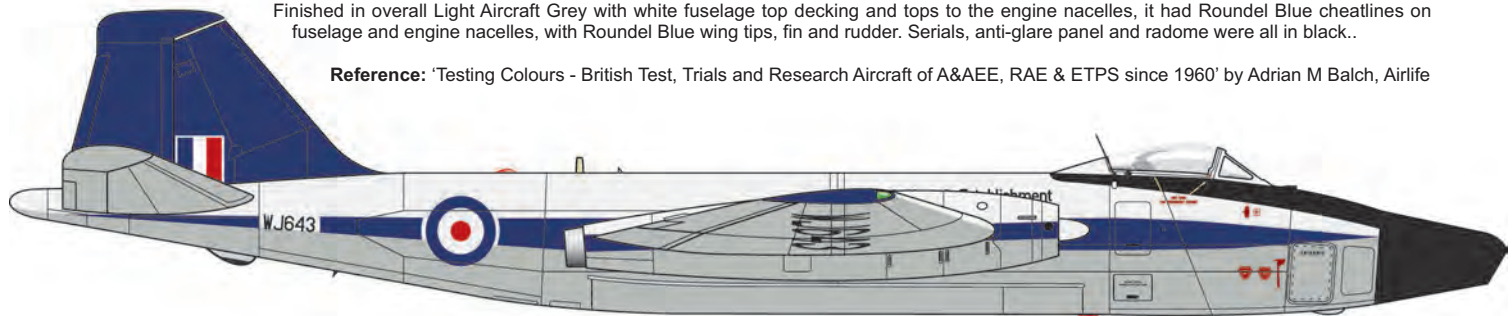
Reference: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife

English Electric Canberra B.2/8 (hybrid), WJ643, Royal Aircraft Establishment, Farnborough, January 1975

WJ643 was used (at this time) on electro-optical sensor trials, but had originally been used by Ferranti in the late 1950s as a 'target aircraft' in conjunction with Airpass radar-equipped Dakota TS423 (see p28).

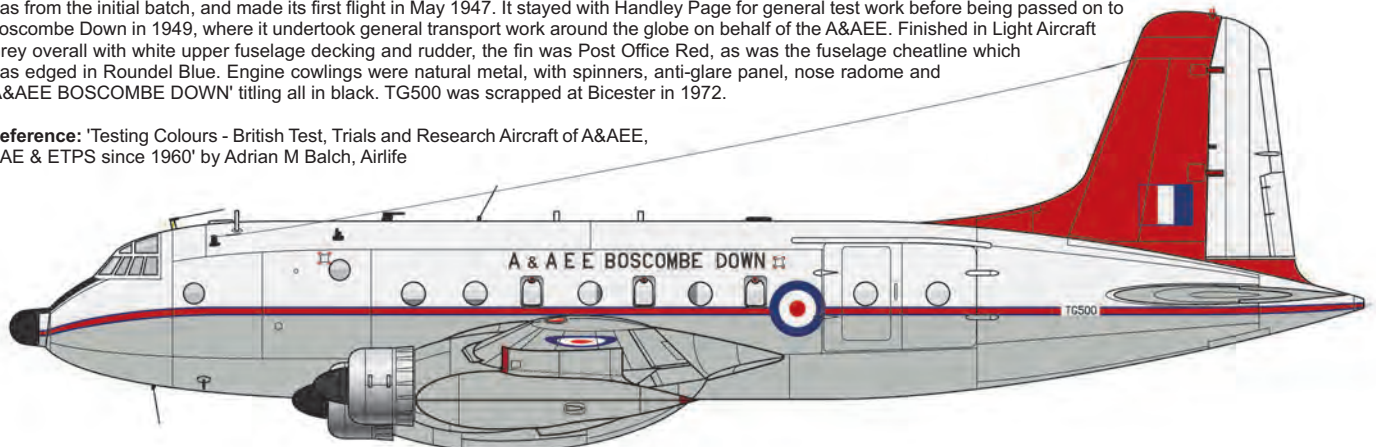
Finished in overall Light Aircraft Grey with white fuselage top decking and tops to the engine nacelles, it had Roundel Blue cheatlines on fuselage and engine nacelles, with Roundel Blue wing tips, fin and rudder. Serials, anti-glare panel and radome were all in black..

Reference: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife

**Handley Page Hastings C.1A, TG500, Aeroplane & Armament Experimental Establishment (A&AEE) Boscombe Down, March 1971**

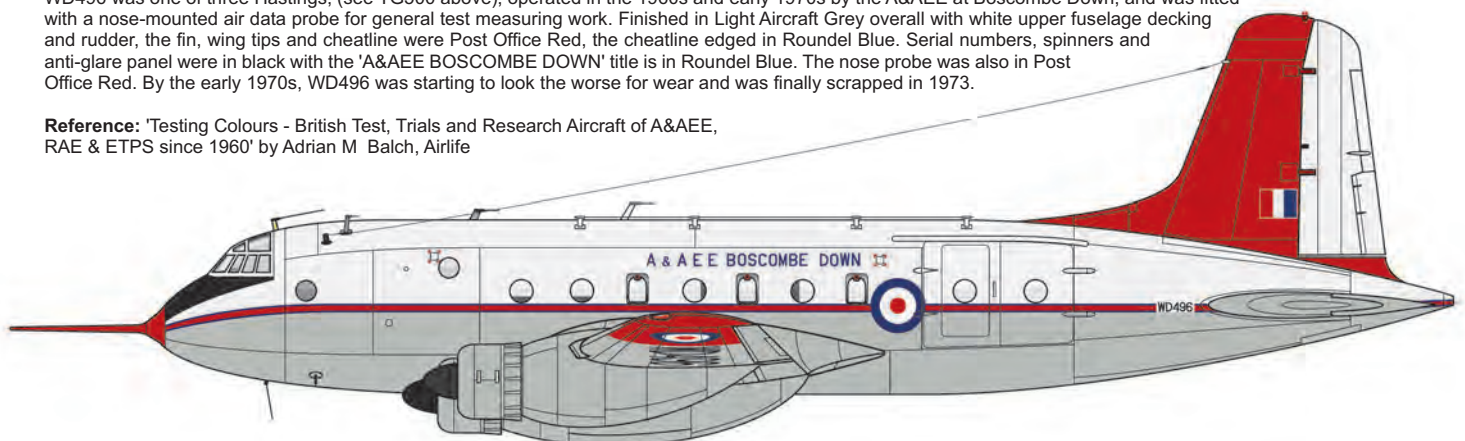
One of the three Hastings operated by the A&AEE during the 1960s and early 1970s (the other two being TG503 and WD496 – see below), TG500 was from the initial batch, and made its first flight in May 1947. It stayed with Handley Page for general test work before being passed on to Boscombe Down in 1949, where it undertook general transport work around the globe on behalf of the A&AEE. Finished in Light Aircraft Grey overall with white upper fuselage decking and rudder, the fin was Post Office Red, as was the fuselage cheatline which was edged in Roundel Blue. Engine cowlings were natural metal, with spinners, anti-glare panel, nose radome and 'A&AEE BOSCOMBE DOWN' titling all in black. TG500 was scrapped at Bicester in 1972.

Reference: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife

**Handley Page Hastings C.2, WD496, Aeroplane & Armament Experimental Establishment (A&AEE) Boscombe Down, June 1972**

WD496 was one of three Hastings, (see TG500 above), operated in the 1960s and early 1970s by the A&AEE at Boscombe Down, and was fitted with a nose-mounted air data probe for general test measuring work. Finished in Light Aircraft Grey overall with white upper fuselage decking and rudder, the fin, wing tips and cheatline were Post Office Red, the cheatline edged in Roundel Blue. Serial numbers, spinners and anti-glare panel were in black with the 'A&AEE BOSCOMBE DOWN' title in in Roundel Blue. The nose probe was also in Post Office Red. By the early 1970s, WD496 was starting to look the worse for wear and was finally scrapped in 1973.

Reference: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife

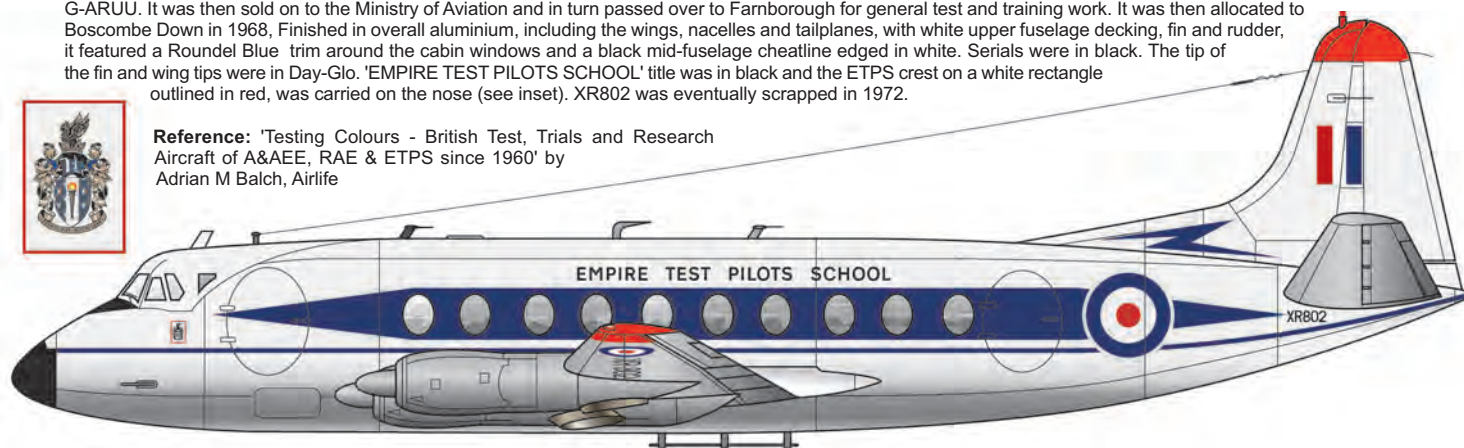


Vickers V.475D Viscount, XR802, Empire Test Pilots School, Aeroplane & Armament Experimental Establishment (A&AEE) Boscombe Down, July 1970

Originally, XR802 operated on the civilian circuit in the United States with Capital Airlines, then Northeast Airlines, before being resold to Vickers-Armstrong as G-ARUU. It was then sold on to the Ministry of Aviation and in turn passed over to Farnborough for general test and training work. It was then allocated to Boscombe Down in 1968. Finished in overall aluminium, including the wings, nacelles and tailplanes, with white upper fuselage decking, fin and rudder, it featured a Roundel Blue trim around the cabin windows and a black mid-fuselage cheatline edged in white. Serials were in black. The tip of the fin and wing tips were in Day-Glo. 'EMPIRE TEST PILOTS SCHOOL' title was in black and the ETPS crest on a white rectangle outlined in red, was carried on the nose (see inset). XR802 was eventually scrapped in 1972.

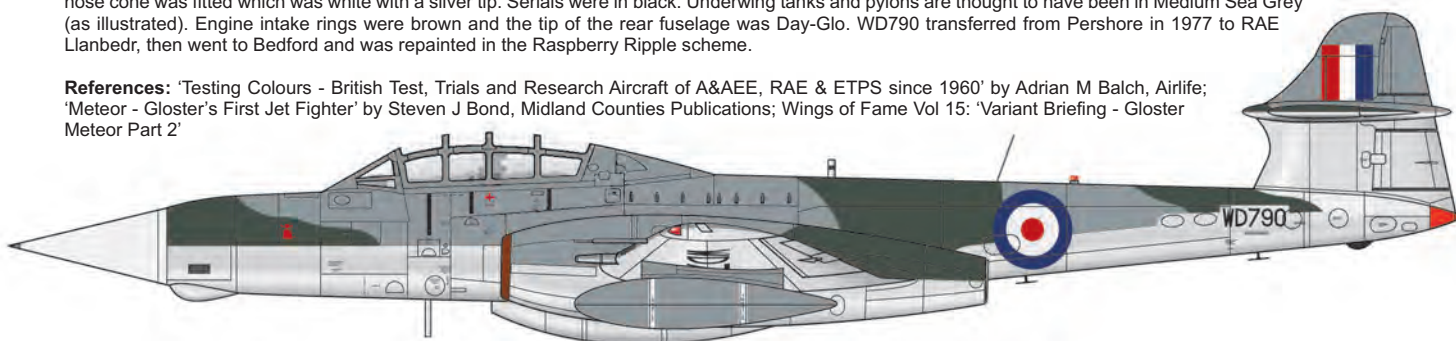


Reference: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, AirLife

**Armstrong Whitworth Meteor NF.11 Hybrid, WD790, Radar Research Establishment, Pershore, Worcestershire, September 1971**

WD790 was the 39th production NF.11 and was designated (albeit off the record) as a Meteor NF.111/2 when it was modified upto NF.12 standard. Initially serving with the Telecommunications Research Establishment (TRE) in 1952 it then went to the Ferranti Flying Unit in 1958, where it was heavily involved in trials in the development of the radar system for TSR.2 and the AI Mk 23 system used on the Lightning. WD790 was also used in development work on Red Brick and Indigo Corkscrew radar systems for Bloodhound and Thunderbird SAM systems. Finished in Dark Sea Grey and Dark Green upper surfaces with Light Aircraft Grey undersides, a new pointed nose cone was fitted which was white with a silver tip. Serials were in black. Underwing tanks and pylons are thought to have been in Medium Sea Grey (as illustrated). Engine intake rings were brown and the tip of the rear fuselage was Day-Glo. WD790 transferred from Pershore in 1977 to RAE Llanbedr, then went to Bedford and was repainted in the Raspberry Ripple scheme.

References: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, AirLife; 'Meteor - Gloster's First Jet Fighter' by Steven J Bond, Midland Counties Publications; Wings of Fame Vol 15: 'Variant Briefing - Gloster Meteor Part 2'



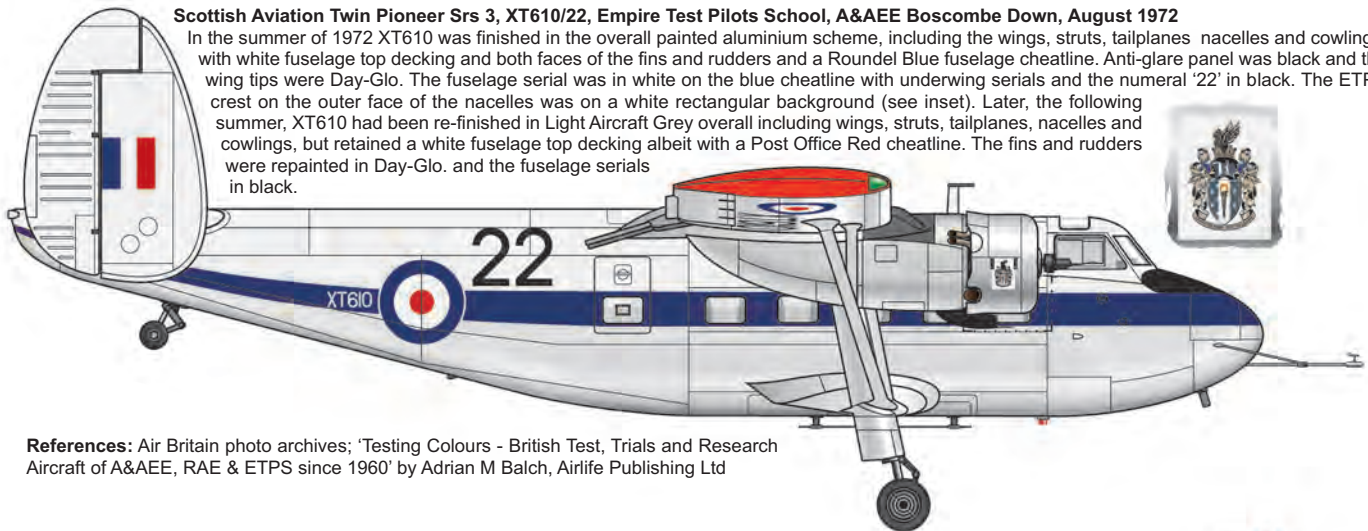
Left: Vickers Viscount XR801 (foreground) and XR802 photographed at Farnborough in September 1962 after having been purchased from civilian ownership and allocated to the ETPS earlier that year. They served with the ETPS and other agencies until taken out of service in 1972 and were scrapped at Coventry in 1974. (See profile at top of page)



Left: Armstrong Whitworth Meteor NF.11, WD790, belonging to the RRE is seen in flight at Finningley in September 1970. Built originally as an NF.11, a quick glance at the fin shows it to have the later 'scalloped' fin leading edge as used by both the NF.12 and later NF.14, a feature that sometimes led to WD790 being referred to, unofficially, as an NF.11½! Fred Martin collection (See profile above)

Scottish Aviation Twin Pioneer Srs 3, XT610/22, Empire Test Pilots School, A&AEE Boscombe Down, August 1972

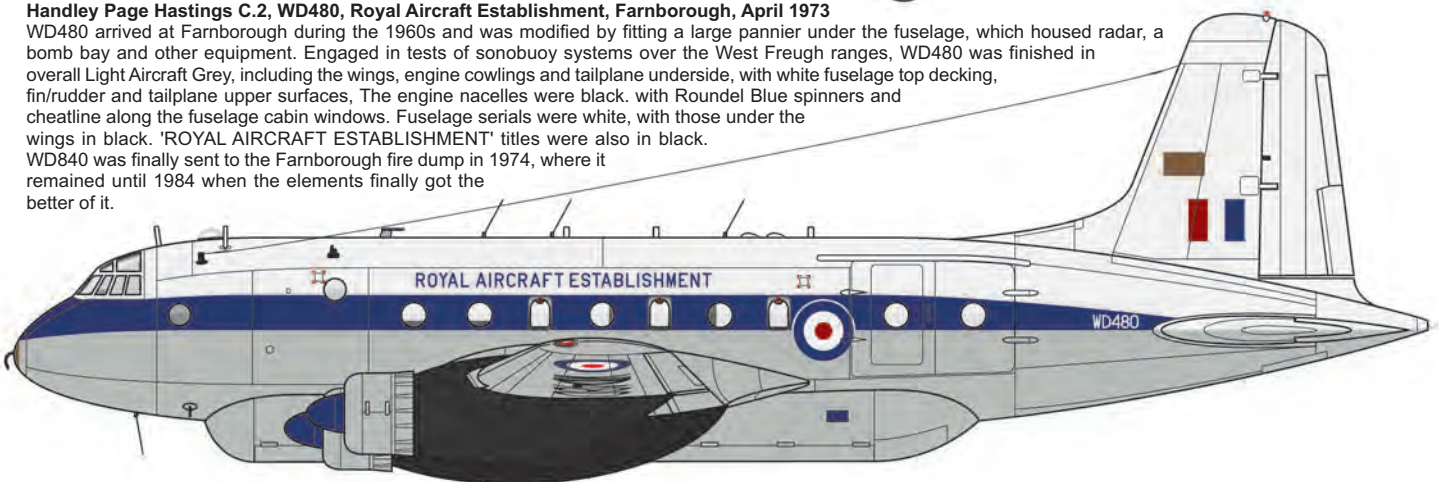
In the summer of 1972 XT610 was finished in the overall painted aluminium scheme, including the wings, struts, tailplanes nacelles and cowlings, with white fuselage top decking and both faces of the fins and rudders and a Roundel Blue fuselage cheatline. Anti-glare panel was black and the wing tips were Day-Glo. The fuselage serial was in white on the blue cheatline with underwing serials and the numeral '22' in black. The ETPS crest on the outer face of the nacelles was on a white rectangular background (see inset). Later, the following summer, XT610 had been re-finished in Light Aircraft Grey overall including wings, struts, tailplanes, nacelles and cowlings, but retained a white fuselage top decking albeit with a Post Office Red cheatline. The fins and rudders were repainted in Day-Glo, and the fuselage serials in black.



References: Air Britain photo archives; 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife Publishing Ltd

Handley Page Hastings C.2, WD480, Royal Aircraft Establishment, Farnborough, April 1973

WD480 arrived at Farnborough during the 1960s and was modified by fitting a large pannier under the fuselage, which housed radar, a bomb bay and other equipment. Engaged in tests of sonobuoy systems over the West Freugh ranges, WD480 was finished in overall Light Aircraft Grey, including the wings, engine cowlings and tailplane underside, with white fuselage top decking, fin/rudder and tailplane upper surfaces. The engine nacelles were black, with Roundel Blue spinners and cheatline along the fuselage cabin windows. Fuselage serials were white, with those under the wings in black. 'ROYAL AIRCRAFT ESTABLISHMENT' titles were also in black. WD480 was finally sent to the Farnborough fire dump in 1974, where it remained until 1984 when the elements finally got the better of it.



References: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife; Warpaint No 62 'Handley Page Hastings' by Alan W Hall, Warpaint Books Ltd

Right: Circa 1971 image of Scottish Aviation Twin Pioneer, XT610 '22', as used by the ETPS following delivery in 1965. Completely repainted in 1973, XT610 remained in service until withdrawn from use in February 1975.

(See profile at top of page)



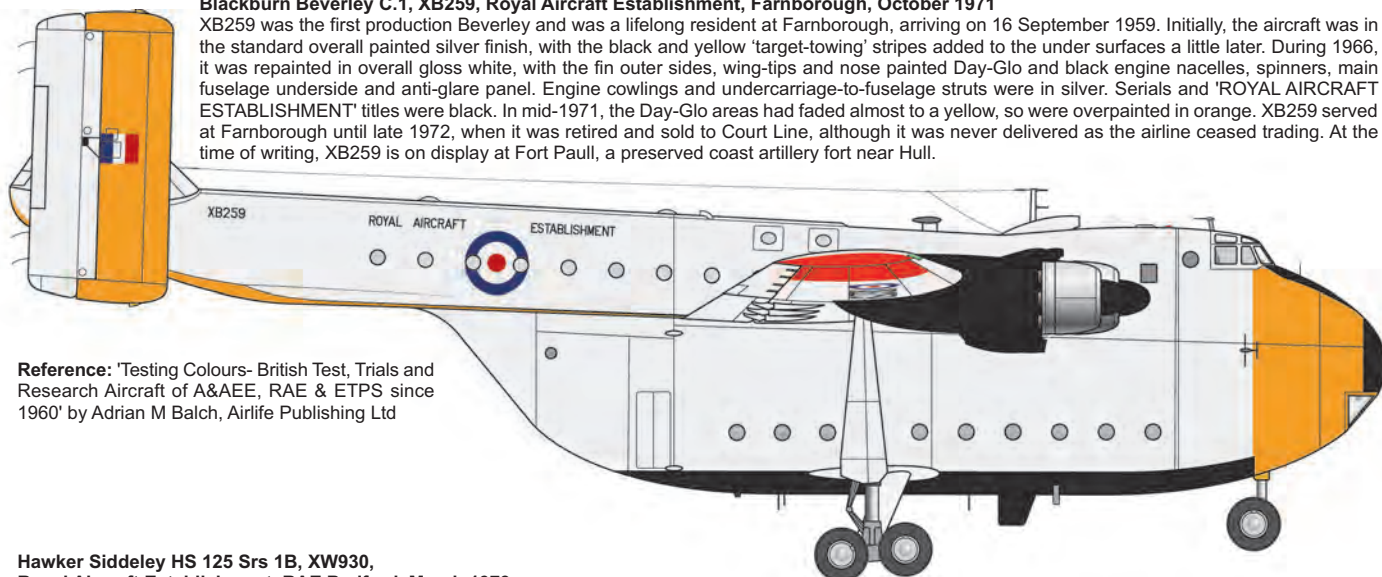
Right: Handley Page Hastings C.2, WD480, belonging to the Royal Aircraft Establishment as seen in March 1969.

(See profile above)



Blackburn Beverley C.1, XB259, Royal Aircraft Establishment, Farnborough, October 1971

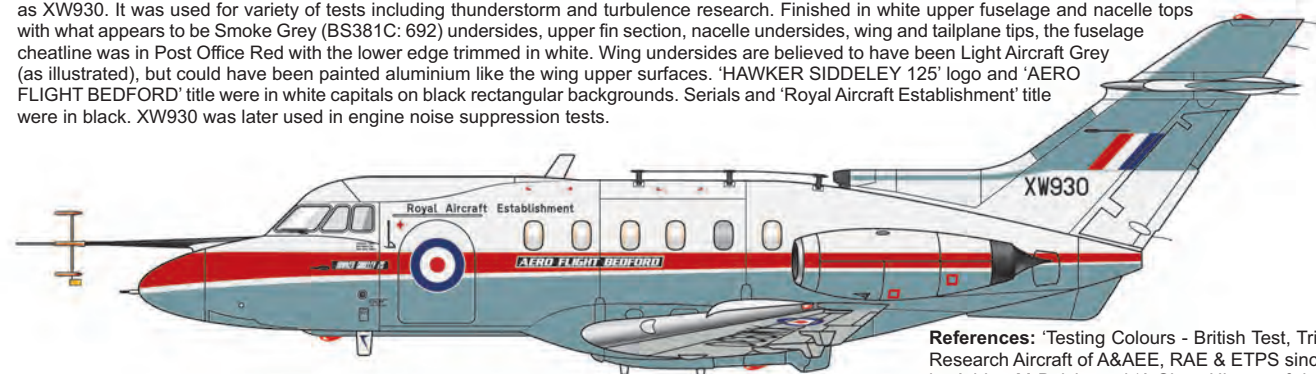
XB259 was the first production Beverley and was a lifelong resident at Farnborough, arriving on 16 September 1959. Initially, the aircraft was in the standard overall painted silver finish, with the black and yellow 'target-towing' stripes added to the under surfaces a little later. During 1966, it was repainted in overall gloss white, with the fin outer sides, wing-tips and nose painted Day-Glo and black engine nacelles, spinners, main fuselage underside and anti-glare panel. Engine cowlings and undercarriage-to-fuselage struts were in silver. Serials and 'ROYAL AIRCRAFT ESTABLISHMENT' titles were black. In mid-1971, the Day-Glo areas had faded almost to a yellow, so were overpainted in orange. XB259 served at Farnborough until late 1972, when it was retired and sold to Court Line, although it was never delivered as the airline ceased trading. At the time of writing, XB259 is on display at Fort Paull, a preserved coast artillery fort near Hull.



Reference: 'Testing Colours- British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airline Publishing Ltd

Hawker Siddeley HS 125 Srs 1B, XW930, Royal Aircraft Establishment, RAE Bedford, March 1973

XW930 was first registered as G-ATPC and used by the Ministry of Aviation. It transferred to the RAE in December 1970, when it was re-registered as XW930. It was used for variety of tests including thunderstorm and turbulence research. Finished in white upper fuselage and nacelle tops with what appears to be Smoke Grey (BS381C: 692) undersides, upper fin section, nacelle undersides, wing and tailplane tips, the fuselage cheatline was in Post Office Red with the lower edge trimmed in white. Wing undersides are believed to have been Light Aircraft Grey (as illustrated), but could have been painted aluminium like the wing upper surfaces. 'HAWKER SIDDELEY 125' logo and 'AERO FLIGHT BEDFORD' title were in white capitals on black rectangular backgrounds. Serials and 'Royal Aircraft Establishment' title were in black. XW930 was later used in engine noise suppression tests.

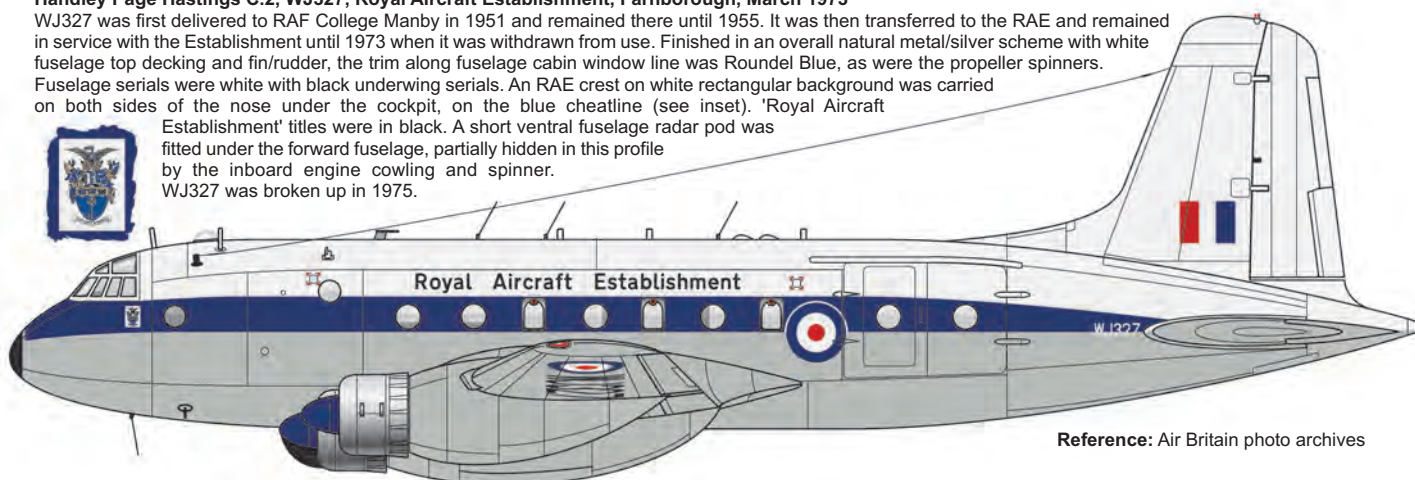


References: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch; and 'A Short History of the Royal Aerospace Establishment Bedford' by Arthur Percy

Handley Page Hastings C.2, WJ327, Royal Aircraft Establishment, Farnborough, March 1973

WJ327 was first delivered to RAF College Manby in 1951 and remained there until 1955. It was then transferred to the RAE and remained in service with the Establishment until 1973 when it was withdrawn from use. Finished in an overall natural metal/silver scheme with white fuselage top decking and fin/rudder, the trim along fuselage cabin window line was Roundel Blue, as were the propeller spinners. Fuselage serials were white with black underwing serials. An RAE crest on white rectangular background was carried on both sides of the nose under the cockpit, on the blue cheatline (see inset). 'Royal Aircraft Establishment' titles were in black. A short ventral fuselage radar pod was fitted under the forward fuselage, partially hidden in this profile by the inboard engine cowling and spinner.

WJ327 was broken up in 1975.

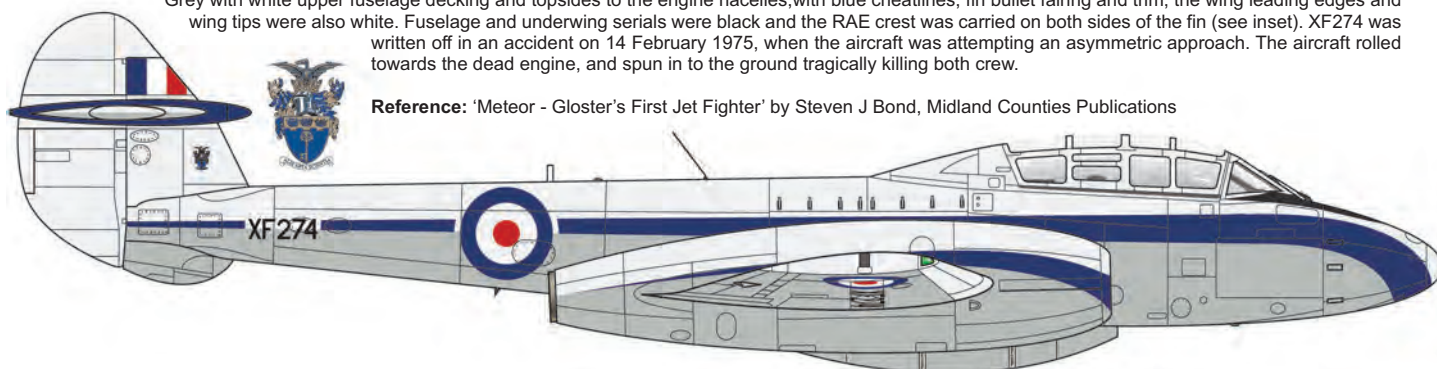


Reference: Air Britain photo archives

Gloster Meteor T.7, XF274, Royal Aircraft Establishment, Farnborough, June 1973

XF274 was the last Meteor T.7 to enter trials service. It originally served with the A&AEE, coded '5', before serving at Farnborough. Finished in overall Light Aircraft Grey with white upper fuselage decking and topsides to the engine nacelles, with blue cheatlines, fin bullet fairing and trim, the wing leading edges and wing tips were also white. Fuselage and underwing serials were black and the RAE crest was carried on both sides of the fin (see inset). XF274 was written off in an accident on 14 February 1975, when the aircraft was attempting an asymmetric approach. The aircraft rolled towards the dead engine, and spun in to the ground tragically killing both crew.

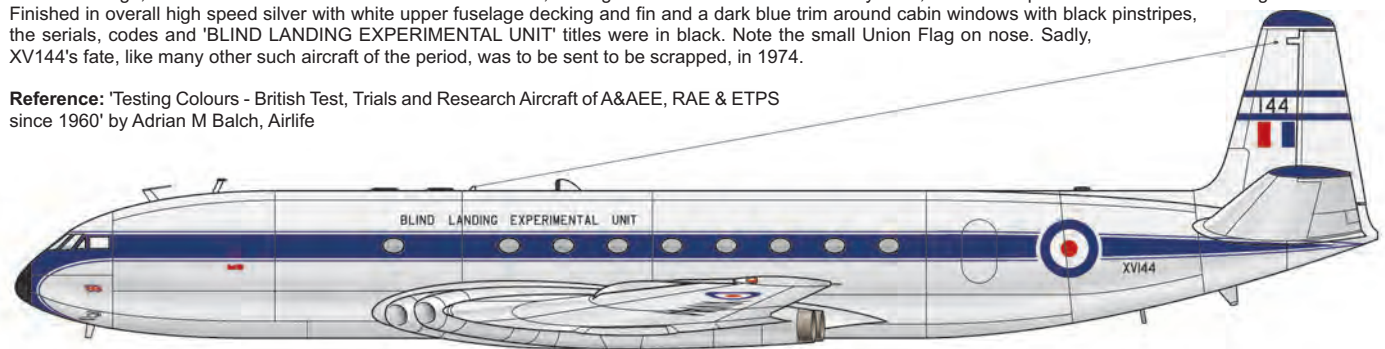
Reference: 'Meteor - Gloster's First Jet Fighter' by Steven J Bond, Midland Counties Publications



De Havilland Comet 2E, XV144/144, Blind Landing Experimental Unit, Royal Aircraft Establishment Bedford, June 1970

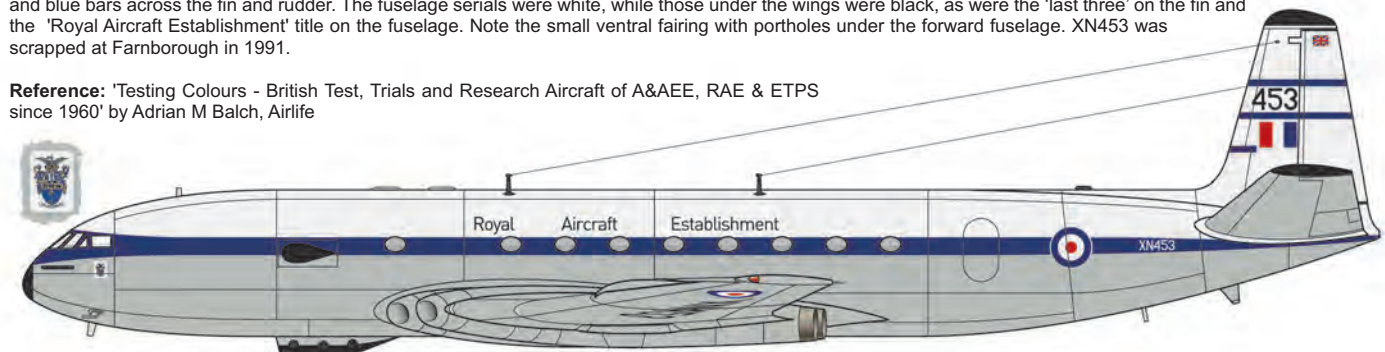
This aircraft originally served with BOAC (British Overseas Airways Corporation) as G-AMXK in the late 1950s but was sold to the Ministry of Supply in October 1960. Put in to storage, it was then sent to RAE Bedford in the mid-1960s, serving with the Establishment until May 1971, when it was passed onto RAE Farnborough. Finished in overall high speed silver with white upper fuselage decking and fin and a dark blue trim around cabin windows with black pinstripes, the serials, codes and 'BLIND LANDING EXPERIMENTAL UNIT' titles were in black. Note the small Union Flag on nose. Sadly, XV144's fate, like many other such aircraft of the period, was to be sent to be scrapped, in 1974.

Reference: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife

**De Havilland Comet 2E, XN453/453, Royal Aircraft Establishment Farnborough, April 1972**

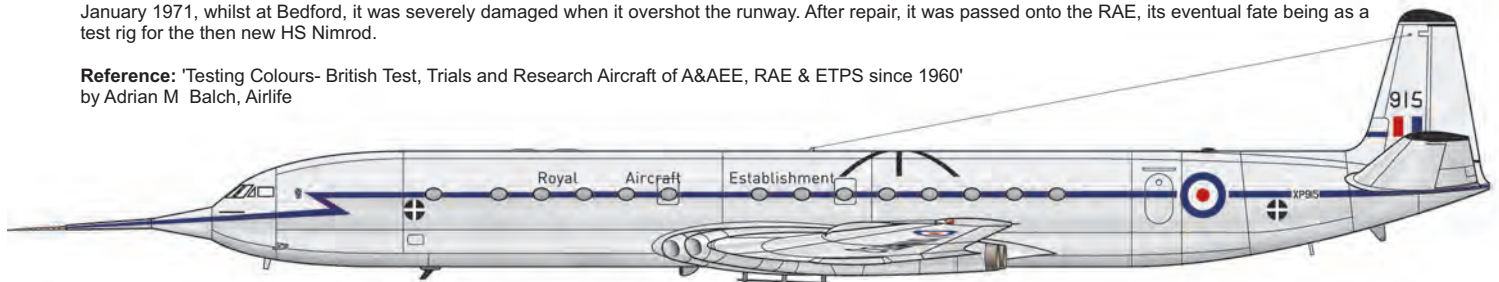
XN453 was previously registered as G-AMXD, (one of two Comet 2 airliners fitted with Avon 504s in the inner nacelles and Avon 524s in the outer ones, and was used by BOAC for proving flights during 1957-1958 – see also profile above), but it was passed over to the RAE at Farnborough in 1959 for use as a radio and navigation aid test aircraft. Finished in overall Light Aircraft Grey with white upper fuselage decking, fin and rudder, it also had Roundel Blue trim along the fuselage cabin windows and blue bars across the fin and rudder. The fuselage serials were white, while those under the wings were black, as were the 'last three' on the fin and the 'Royal Aircraft Establishment' title on the fuselage. Note the small ventral fairing with portholes under the forward fuselage. XN453 was scrapped at Farnborough in 1991.

Reference: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife

**De Havilland Comet 3B, XP915/915, Royal Aircraft Establishment Farnborough, April 1972**

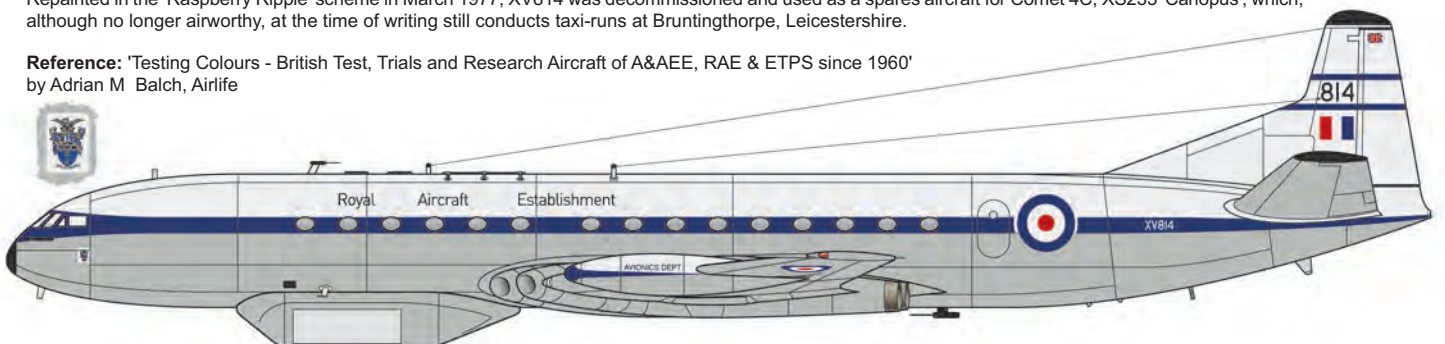
Looking distinctly narwhal-like, with its long nose probe, XP915 was originally registered as G-ANLO, the Comet 3 prototype (and the only Comet 3 to fly). A larger and much improved aircraft over the Comet 2, with more advanced Rolls-Royce Avon engines, a 15ft longer fuselage with room for more passengers, and ability to carry 20% more fuel, XP915 served with the Blind Landing Experimental Unit at RAE Bedford from June 1961. Finished in overall high speed silver with white upper fuselage decking, fin and rudder, the cheatline trim was Roundel Blue with the fuselage and underwing serials in black. The 'last three' on the fin and 'Royal Aircraft Establishment' titles on the fuselage sides were in black. A black photo-calibration 'cross' was carried on the upper decking and the black and white photo-calibration discs applied to the front and rear of the fuselage. XP915/G-ANLO had the distinction of not only being the only Comet 3 to fly, but the first airliner to circumnavigate the globe. In January 1971, whilst at Bedford, it was severely damaged when it overshot the runway. After repair, it was passed onto the RAE, its eventual fate being as a test rig for the then new HS Nimrod.

Reference: 'Testing Colours- British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife

**De Havilland Comet 4, XV814/814, Royal Aircraft Establishment Farnborough, April 1972**

Another ex-BOAC Comet, XV814 was delivered to Farnborough in the late 1960s/early 1970s, (the actual date is unconfirmed), and served on a number of test programmes. Finished in overall Light Aircraft Grey with white upper fuselage decking, fin and rudder, the trim along the fuselage cabin windows and the two bars across the fin and rudder were Roundel Blue. The fuselage serials were white (on the blue trim), while those under the wings were black. The 'last three' on the fin, 'Royal Aircraft Establishment' titles on the fuselage and 'AVIONICS DEPT' on wing pod were black. A large underfuselage fairing was fitted to allow carriage of various equipment. Repainted in the 'Raspberry Ripple' scheme in March 1977, XV814 was decommissioned and used as a spares aircraft for Comet 4C, XS235 'Canopus', which, although no longer airworthy, at the time of writing still conducts taxi-runs at Bruntingthorpe, Leicestershire.

Reference: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife



McDonnell Phantom FG.1, XT597, Aircraft & Armament Experimental Establishment (A&AEE), Boscombe Down, March 1975

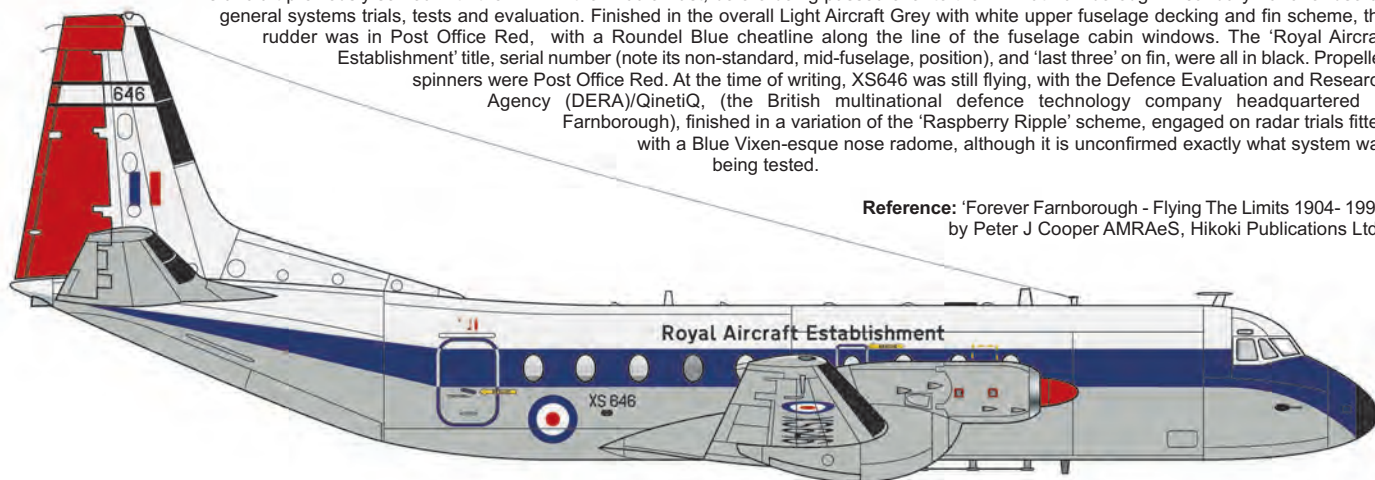
XT597 was first delivered in 1968 and this illustration shows the aircraft in its initial guise when serving with the Royal Navy Test Squadron in the overall Extra Dark Sea Grey upper surfaces with white undersides scheme. The fin and the outer wing section upper surfaces were in Post Office Red – although they should have been Signal Red, but were painted Post Office Red in error. 'A&AEE' titles and serials were in white as was the nose probe, with red banding, that starts horizontally at the nose cone before running vertically around the rest of the probe.

Reference: 'Cold War Years - Flight Testing at Boscombe Down 1945-1975' by Tim Mason, Hikoki Publications

**Hawker Siddeley Andover C.1, XS646, Royal Aircraft Establishment Farnborough, April 1975**

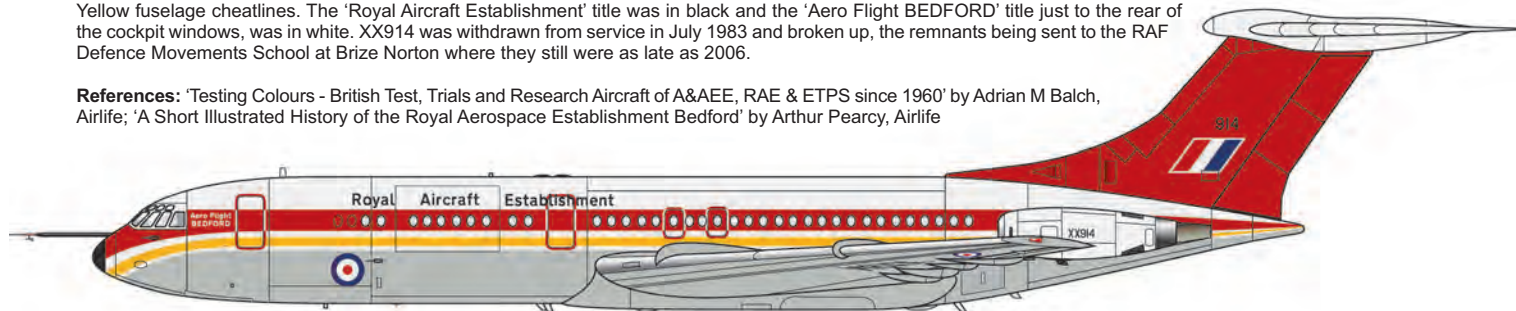
This aircraft previously served with the RAF in the Middle East, before being passed over to the RAE at Farnborough in January 1973 for use on general systems trials, tests and evaluation. Finished in the overall Light Aircraft Grey with white upper fuselage decking and fin scheme, the rudder was in Post Office Red, with a Roundel Blue cheatline along the line of the fuselage cabin windows. The 'Royal Aircraft Establishment' title, serial number (note its non-standard, mid-fuselage, position), and 'last three' on fin, were all in black. Propeller spinners were Post Office Red. At the time of writing, XS646 was still flying, with the Defence Evaluation and Research Agency (DERA)/QinetiQ, (the British multinational defence technology company headquartered in Farnborough), finished in a variation of the 'Raspberry Ripple' scheme, engaged on radar trials fitted with a Blue Vixen-esque nose radome, although it is unconfirmed exactly what system was being tested.

Reference: 'Forever Farnborough - Flying The Limits 1904- 1996' by Peter J Cooper AMRAeS, Hikoki Publications Ltd

**Vickers VC 10-1103, XX914/914, Aero Flight Systems, Royal Aircraft Establishment, Bedford, July 1974**

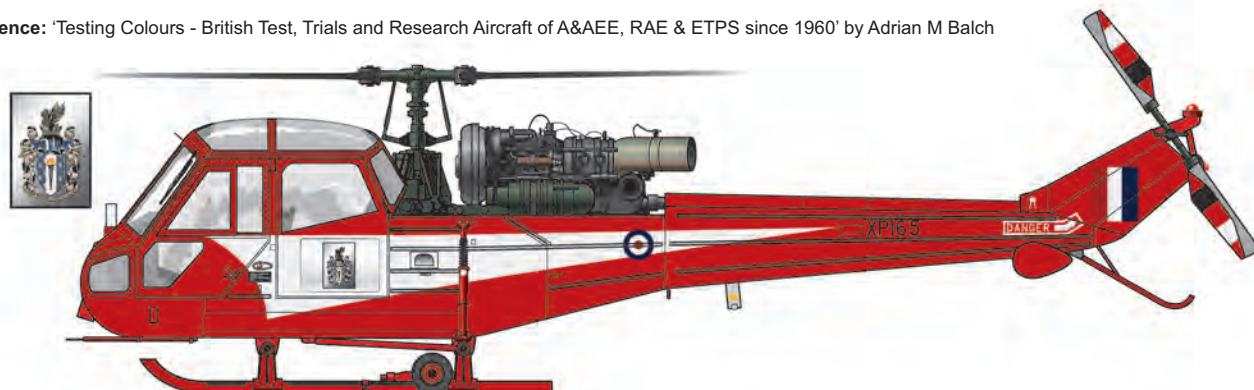
This aircraft was originally registered as 9G-ABQ for Ghana Airways, but delivery was cancelled and instead the aircraft went to British United Airways, (before being merged into British Caledonian), as G-ATDJ. It then went to the RAE at Bedford in March 1973 and was used as a flying laboratory and general test aircraft. Finished in overall Light Aircraft Grey with white fuselage top decking, engine pods and tailplanes, the fin and rudder were Post Office Red, with Post Office Red, white and Golden Yellow fuselage cheatlines. The 'Royal Aircraft Establishment' title was in black and the 'Aero Flight BEDFORD' title just to the rear of the cockpit windows, was in white. XX914 was withdrawn from service in July 1983 and broken up, the remnants being sent to the RAF Defence Movements School at Brize Norton where they still were as late as 2006.

References: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airline; 'A Short Illustrated History of the Royal Aerospace Establishment Bedford' by Arthur Percy, Airline

**Westland Scout AH.1, XP165, Empire Test Pilots School, Aircraft & Armament Experimental Establishment, Boscombe Down, March 1971**

XP165 was actually the first Scout AH.1 to be built, and first flew on 29 August 1960. It initially served on test work with Fairey, Blackburn, Westland and the RAE before going to the A&AEE. Finished in overall Post Office Red with a white flash down the side, the serials were in black. The ETPS crest was on a silver background on fuselage sides. (see inset)

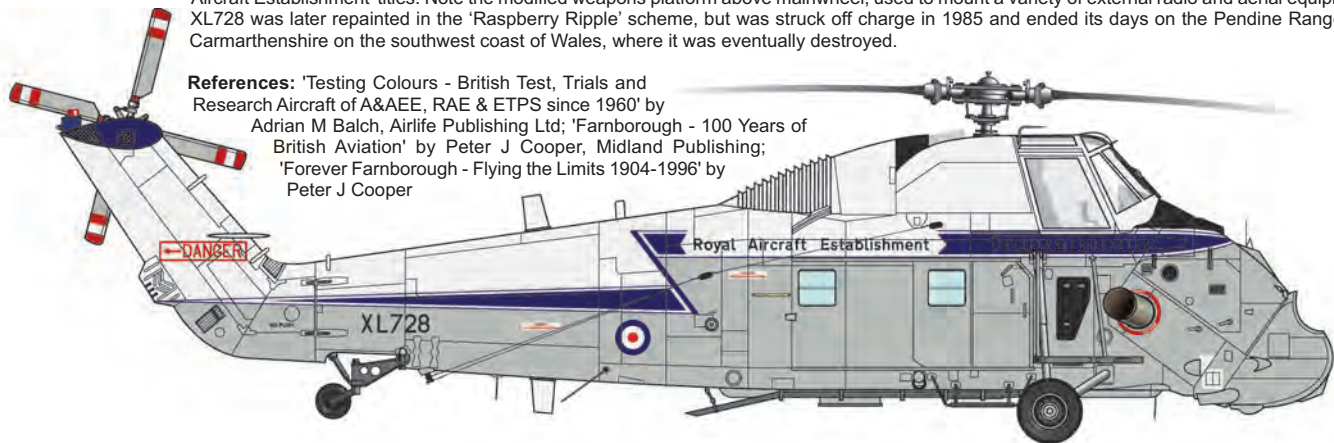
Reference: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch



Westland Wessex Mk 5 (Hybrid), XL728, Radio & Navigation Flight, RAE Farnborough, September 1972

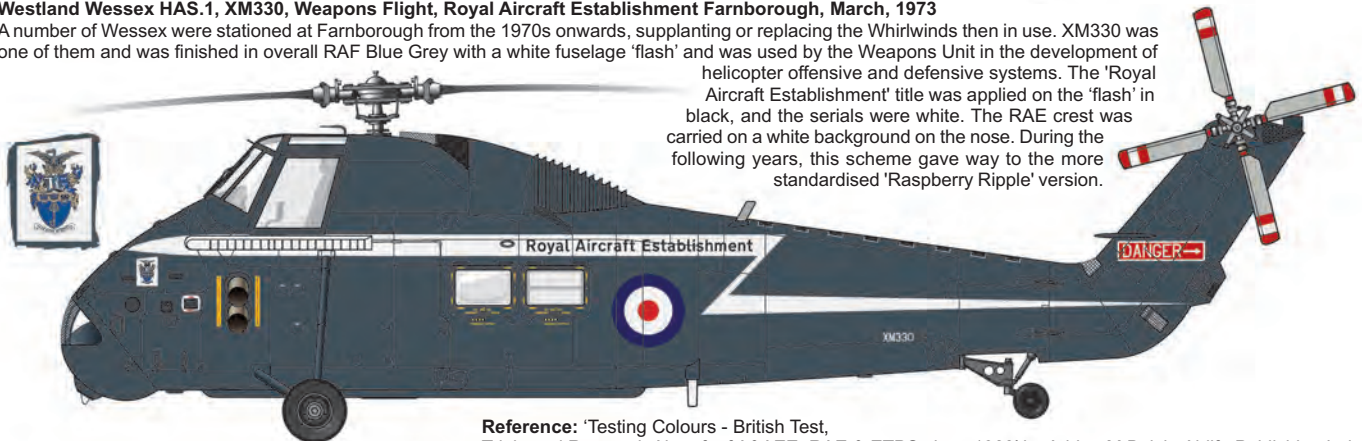
XL728 originally started life as an HAS.1 but was upgraded to Mk 5 standard becoming known as a Mk 5 (Hybrid). It was the second pre-production Wessex and spent all of its life at Farnborough. Finished in Light Aircraft Grey with white fuselage top decking, it had a Roundel Blue fuselage cheatline/flash and black serials and 'Royal Aircraft Establishment' titles. Note the modified weapons platform above mainwheel, used to mount a variety of external radio and aerial equipment. XL728 was later repainted in the 'Raspberry Ripple' scheme, but was struck off charge in 1985 and ended its days on the Pendine Ranges, in Carmarthenshire on the southwest coast of Wales, where it was eventually destroyed.

References: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife Publishing Ltd; 'Farnborough - 100 Years of British Aviation' by Peter J Cooper, Midland Publishing; 'Forever Farnborough - Flying the Limits 1904-1996' by Peter J Cooper



Westland Wessex HAS.1, XM330, Weapons Flight, Royal Aircraft Establishment Farnborough, March, 1973

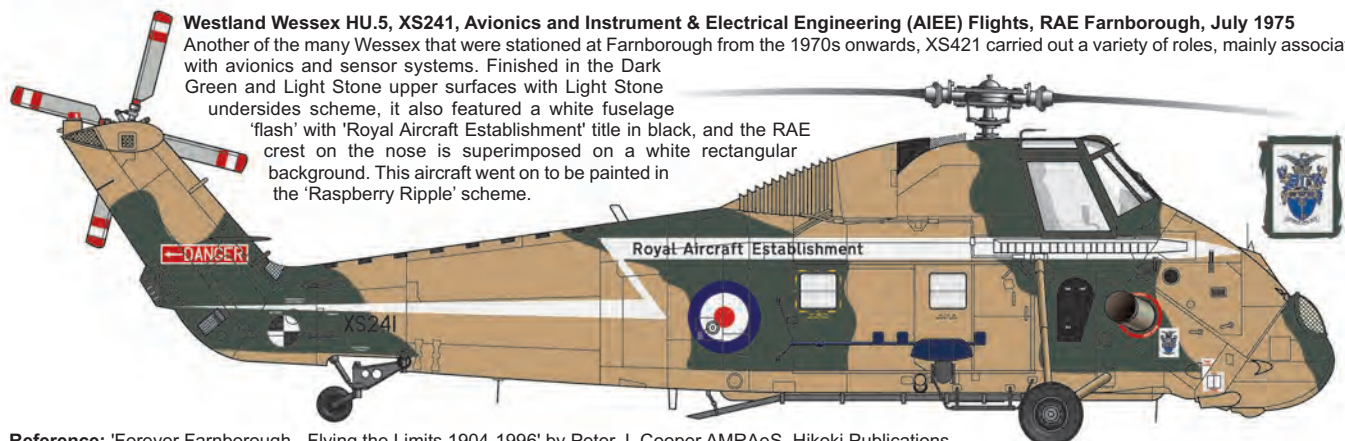
A number of Wessex were stationed at Farnborough from the 1970s onwards, supplanting or replacing the Whirlwinds then in use. XM330 was one of them and was finished in overall RAF Blue Grey with a white fuselage 'flash' and was used by the Weapons Unit in the development of helicopter offensive and defensive systems. The 'Royal Aircraft Establishment' title was applied on the 'flash' in black, and the serials were white. The RAE crest was carried on a white background on the nose. During the following years, this scheme gave way to the more standardised 'Raspberry Ripple' version.



Reference: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife Publishing Ltd

Westland Wessex HU.5, XS241, Avionics and Instrument & Electrical Engineering (AIEE) Flights, RAE Farnborough, July 1975

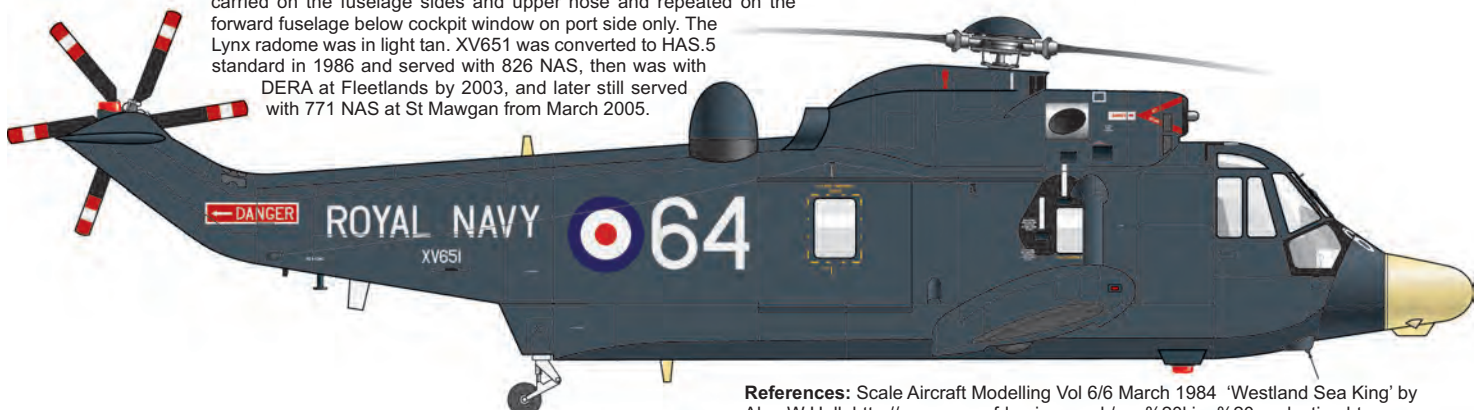
Another of the many Wessex that were stationed at Farnborough from the 1970s onwards, XS241 carried out a variety of roles, mainly associated with avionics and sensor systems. Finished in the Dark Green and Light Stone upper surfaces with Light Stone undersides scheme, it also featured a white fuselage 'flash' with 'Royal Aircraft Establishment' title in black, and the RAE crest on the nose is superimposed on a white rectangular background. This aircraft went on to be painted in the 'Raspberry Ripple' scheme.



Reference: 'Forever Farnborough - Flying the Limits 1904-1996' by Peter J. Cooper AMRAeS, Hikoki Publications

Westland Sea King HAS.1, XV651/064, Royal Signals and Radar Establishment Pershore, Worcestershire, 1975

Built as HAS.1 and first flown on 17 October 1969, XV651 was delivered to the RAE at Boscombe Down on 7 November 1969. It was later fitted with a Ferranti Sea Spray radar system, in a Lynx nose cone, as part of the Westland Lynx helicopter trials at the Royal Signals and Radar Establishment (RSRE), Pershore in Worcestershire. Finished in overall RAF Blue Grey with serials, codes and 'ROYAL NAVY' title in white, the anti-glare panel was in black. The code number '64' was carried on the fuselage sides and upper nose and repeated on the forward fuselage below cockpit window on port side only. The Lynx radome was in light tan. XV651 was converted to HAS.5 standard in 1986 and served with 826 NAS, then was with DERA at Fleetlands by 2003, and later still served with 771 NAS at St Mawgan from March 2005.



References: Scale Aircraft Modelling Vol 6/6 March 1984 'Westland Sea King' by Alan W Hall; <http://www.sonsofdamien.co.uk/sea%20king%20production.htm>

Continued from page 59

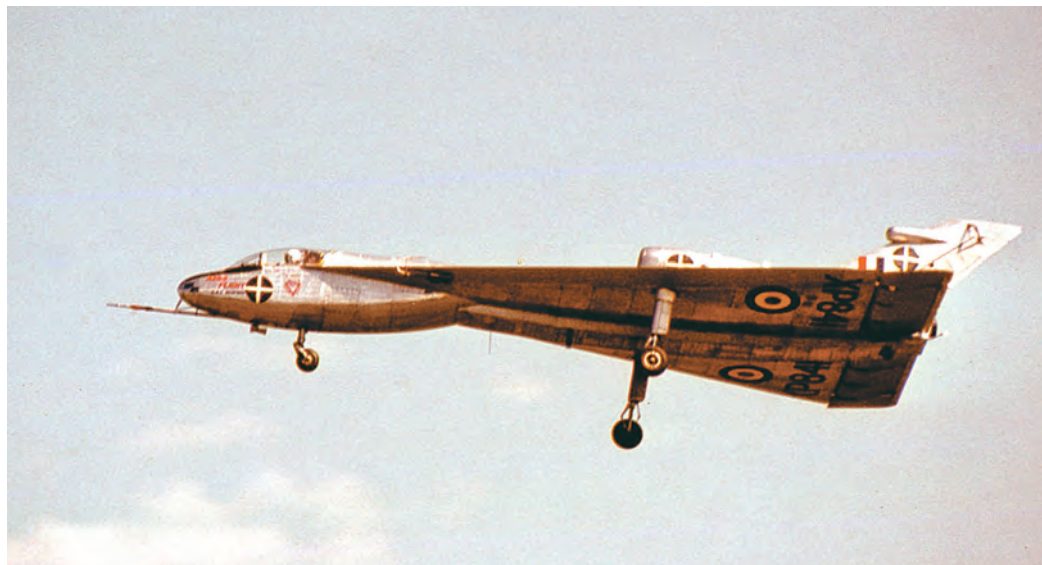
By the middle years of the 1970s, the number of aircraft at both Farnborough and Boscombe Down was somewhat less than in the heyday of the late World War Two and early post-war periods. At Boscombe Down, just short of fifty aircraft were assigned in 1975, while at Farnborough some forty were on strength (there had been approximately eighty at Farnborough in the early 1950s, before the new RAE at Bedford took on some of Farnborough's flight test duties). However, these totals varied from time to time depending on the trials being undertaken and on other factors such as overseas deployments for cold weather testing or many other factors. The number of service personnel at Boscombe Down had noticeably fallen over the years, as more tasks were civilianised and the number of aircraft that were assigned had decreased.

Indeed, a number of changes had taken place during the previous years to the aircraft-operating units within the A&AEE structure. The original four squadrons of the post-war years were added to in 1960 by a Support Squadron to assist in foreign trials and a variety of other duties, but in 1964 a fifth 'lettered' squadron, 'E' Squadron, had been created specifically to cover transport aircraft trials. The naval aircraft 'C' Squadron was eventually disbanded in 1971, and in 1974 this fate awaited 'E' Squadron. Increasingly, aircraft flying was concentrated into just three squadrons, 'A', 'B' and 'D' Squadrons, which was theoretically a more efficient organisation but in practice

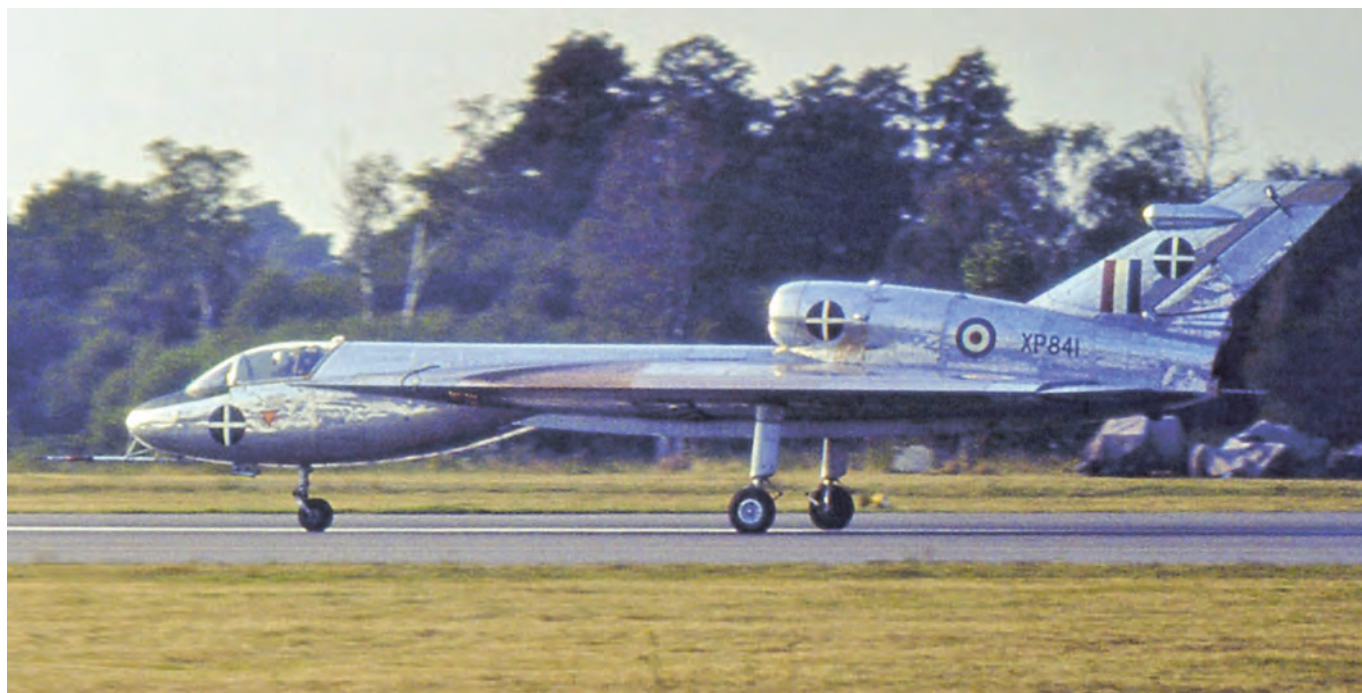
reflected the smaller number of new types that were being brought forward for service evaluation and release.

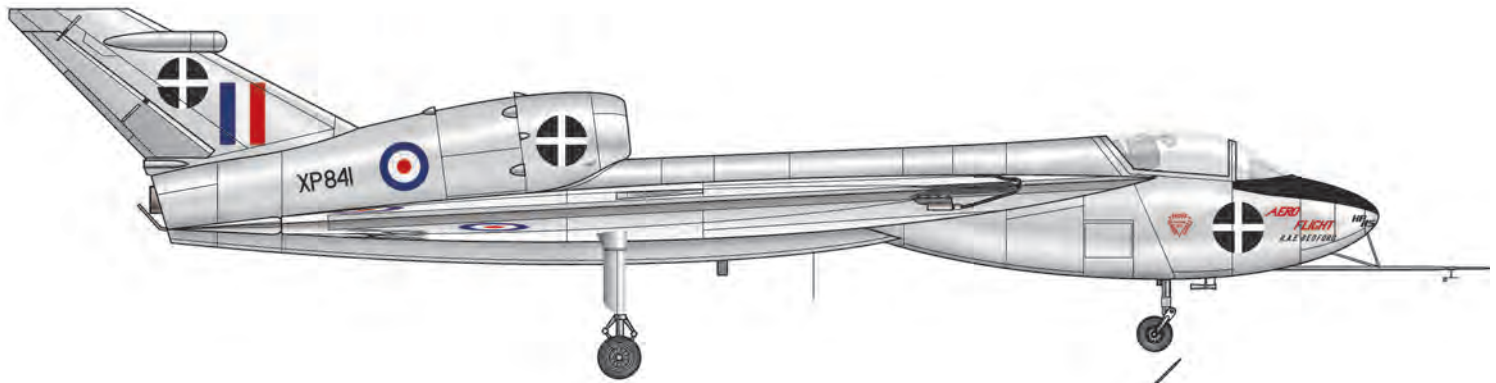
Nevertheless, the amount and variety of work continued throughout the 1970s to be considerably varied, while advances were made with telemetry for recording test results, and increasing miniaturisation took place. A considerable amount of development work was undertaken towards the capability to fly in adverse weather particularly at low level, and in the accurate aiming of weapons. This was partly through American experience in the Vietnam War during the 1960s, where early guided weapons such as the Martin 'Bullpup' air-to-surface missile had proved to be less than successful on many occasions.

Equipment to improve precision targeting capability or to allow safe flight in adverse weather or at night, such as Forward Looking Infra Red (FLIR) devices, underwent considerable testing and development work at the RAE during this period. Just to prove that much of the behind-the-scenes development effort that took place often did not need to be flown in the latest high-performance types, some of the RAE's FLIR research was performed with flight testing carried out in a converted Vickers Varsity twin-engined transport. Weapons development work, including the then relatively new concept of laser-guided munitions, was performed at the RAE site at West Freugh in Scotland and at a variety of weapons ranges.



Left and below: Two images of the Handley Page HP.115, XP841, as used by Aero Flight, RAE Bedford. Both photos were taken at Farnborough in September 1964, and both have the titles 'Aero Flight' & 'R.A.E. Bedford' on the nose, but in the non-flying image sunlight, reflecting on the highly-polished natural metal nose cone, serves to obliterate any wording. (See 4-view opposite)

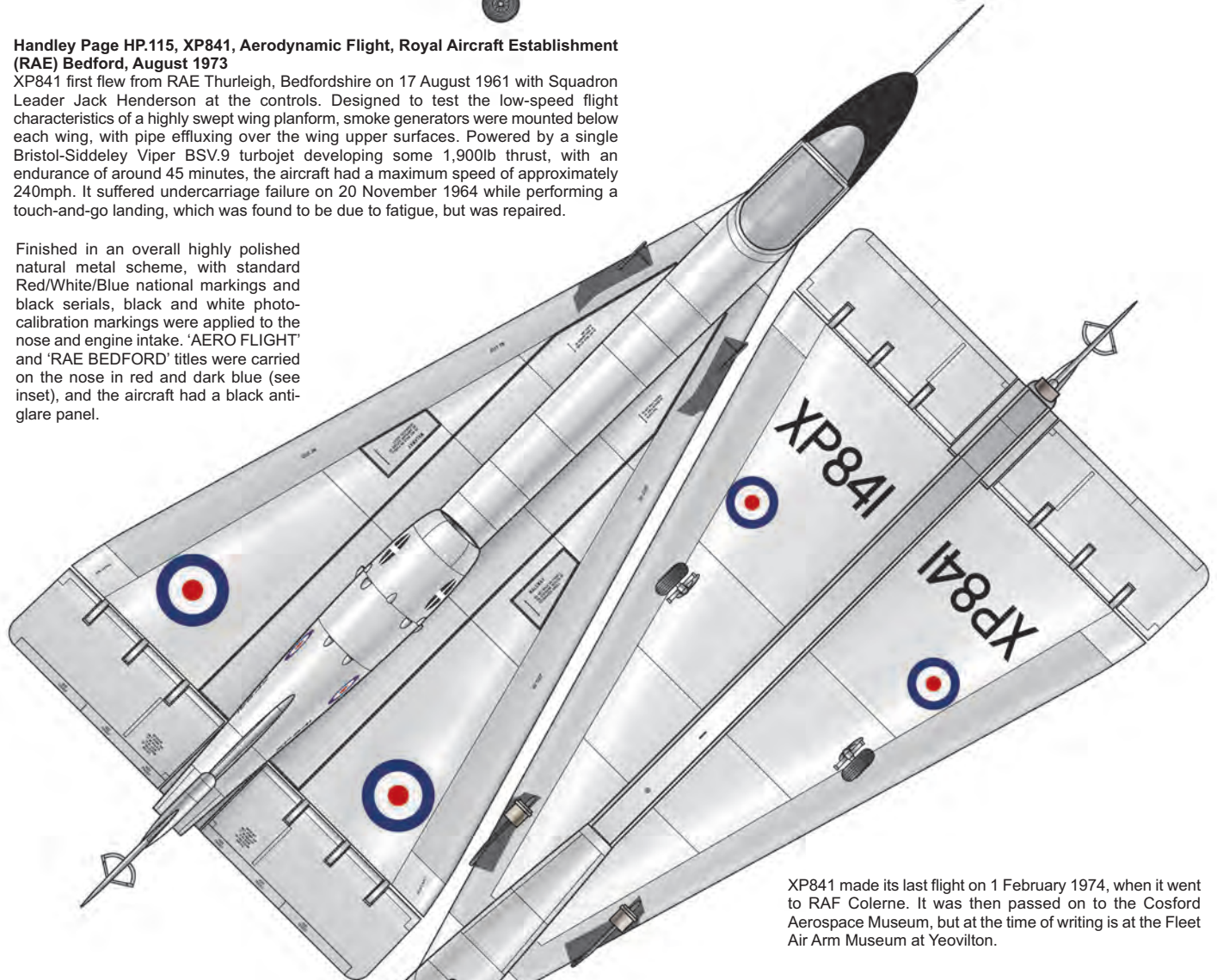




Handley Page HP.115, XP841, Aerodynamic Flight, Royal Aircraft Establishment (RAE) Bedford, August 1973

XP841 first flew from RAE Thurleigh, Bedfordshire on 17 August 1961 with Squadron Leader Jack Henderson at the controls. Designed to test the low-speed flight characteristics of a highly swept wing planform, smoke generators were mounted below each wing, with pipe effluxing over the wing upper surfaces. Powered by a single Bristol-Siddeley Viper BSV.9 turbojet developing some 1,900lb thrust, with an endurance of around 45 minutes, the aircraft had a maximum speed of approximately 240mph. It suffered undercarriage failure on 20 November 1964 while performing a touch-and-go landing, which was found to be due to fatigue, but was repaired.

Finished in an overall highly polished natural metal scheme, with standard Red/White/Blue national markings and black serials, black and white photo-calibration markings were applied to the nose and engine intake. 'AERO FLIGHT' and 'RAE BEDFORD' titles were carried on the nose in red and dark blue (see inset), and the aircraft had a black anti-glare panel.



XP841 made its last flight on 1 February 1974, when it went to RAF Colerne. It was then passed on to the Cosford Aerospace Museum, but at the time of writing is at the Fleet Air Arm Museum at Yeovilton.

References: 'British Prototype Aircraft' by Ray Sturtivant, Haynes; and 'A Short Illustrated History of the Royal Aerospace Establishment Bedford' by Arthur Percy, AirLife



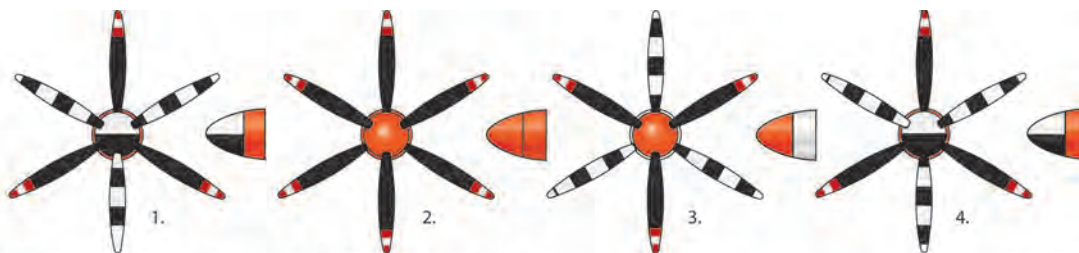


Above: The longest-lived Shackleton MR.1/T.4, VP293, first flew in July 1951. Converted to a T.4 from August 1956, it was later stored until selected for use by the RAE in January 1964 for trials work – for which it received a most distinctive colour scheme. The latter was retained, with variations, until VP293 was retired on 23 May 1975 and later sold to the Strathallen Aircraft Collection where it arrived on 3 May 1976, when this image was taken. Fred Martin collection

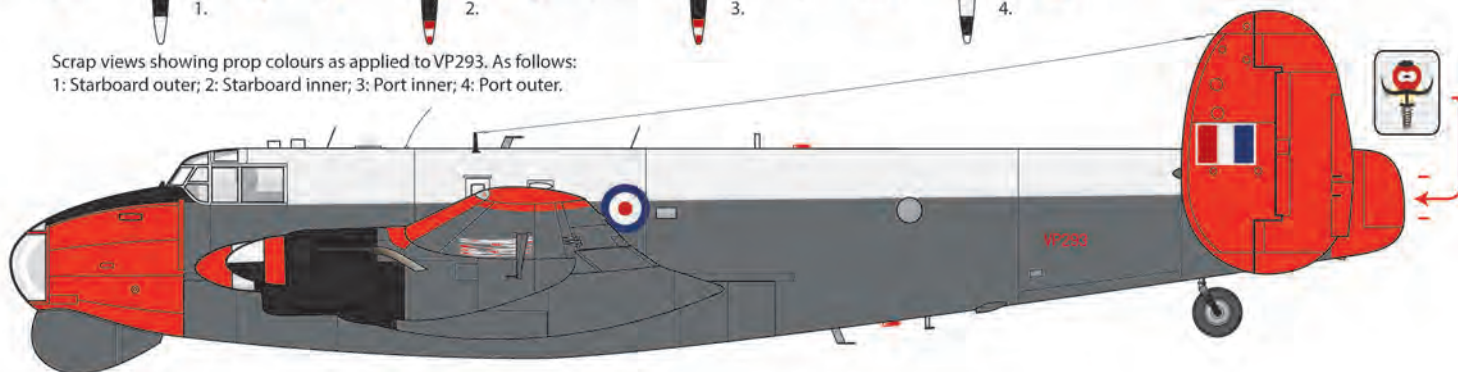
Avro Shackleton T.4, VP293, 'Zebedee' of the Weapons Flight, RAE Farnborough, 1973

VP293 was originally an MR.1 and first flew on 18 July 1951. After serving with several Coastal Command squadrons throughout the mid-1950s, it was converted to T.4 standard at Avro Langer between August 1956 and March 1958, following which it was sent to the A&AEE, Boscombe Down for official clearance of mods before being transferred to the Maritime Operational Training Unit (MOTU) at RAF Kinloss on 1st March 1960. Following further modifications at Avro Langer and Avro Bracebridge Heath between April 1962 and February 1963, it was taken on the strength of the RAE Farnborough for trials work in January 1964. Finished in the standard RAF Coastal Command scheme of Dark Sea Grey overall with white fuselage top decking, the nose, fins, extreme rear fuselage and wing leading edges and tips were painted in Day-Glo. Forward sections of the engine nacelles were in black. The propeller spinners were painted in differing combinations of black and white, white and Day-Glo or black, white and Day-Glo and the propeller blades were painted in combinations of black and white stripes or black with red and white tips – see separate variations. The serials were in red, with those under the wings outlined in white. Upper wing roundels had white outlines and the anti-glare panel was black. The aircraft was nicknamed 'Zebedee' after the 1960s/1970s 'Magic Roundabout' children's TV programme character because of the internal equipment having to be mounted on springs to dampen vibration due to the Shackleton's 'choppy' flight characteristics, and the fact that the type suffered from landing 'bounce'. A cartoon of the 'Zebedee' character was applied on tip of tail and reportedly on fuselage sides. VP293 was retired from use in 1975, and was eventually sold to the Strathallen Collection in 1976. After more than a decade on outside display, the aircraft was broken up in 1988 due to corrosion. At the time of writing, the nose section of VP293 survives, looked after by the Shackleton Preservation Trust on behalf of its owner Norman Thelwell. The nose section is trailer mounted and used by the Trust at various events around the country to promote the work being carried out at Coventry on another Shackleton, WR963.

References: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch; Air Britain photo archives



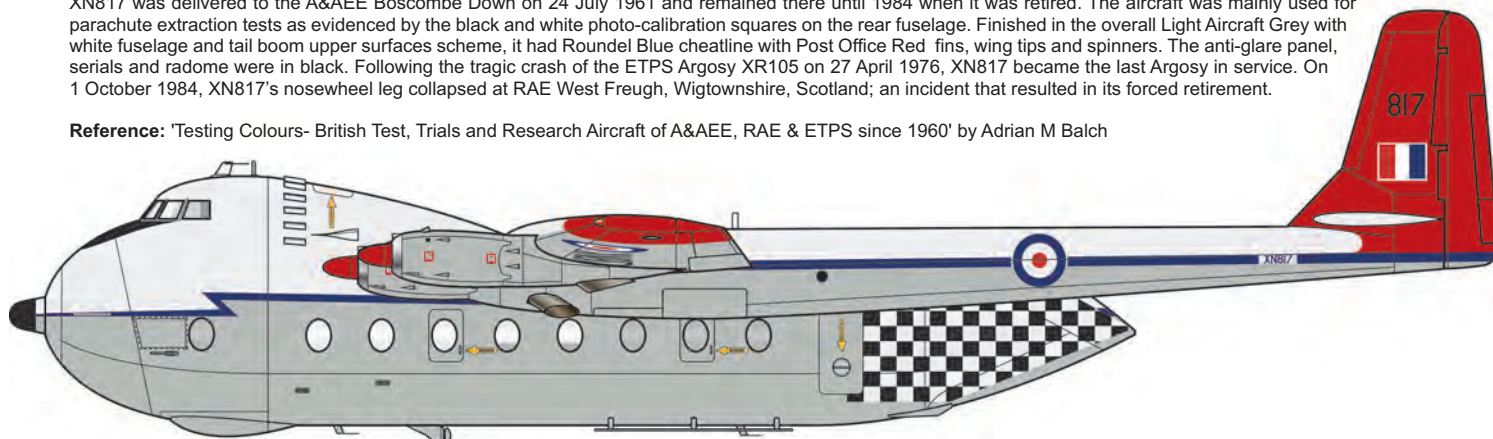
Scrap views showing prop colours as applied to VP293. As follows:
1: Starboard outer; 2: Starboard inner; 3: Port inner; 4: Port outer.



Armstrong Whitworth Argosy C.1, XN817/817, Aeroplane & Armament Experimental Establishment (A&AEE) Boscombe Down, April 1974

XN817 was delivered to the A&AEE Boscombe Down on 24 July 1961 and remained there until 1984 when it was retired. The aircraft was mainly used for parachute extraction tests as evidenced by the black and white photo-calibration squares on the rear fuselage. Finished in the overall Light Aircraft Grey with white fuselage and tail boom upper surfaces scheme, it had Roundel Blue cheatline with Post Office Red fins, wing tips and spinners. The anti-glare panel, serials and radome were in black. Following the tragic crash of the ETPS Argosy XR105 on 27 April 1976, XN817 became the last Argosy in service. On 1 October 1984, XN817's nosewheel leg collapsed at RAE West Freugh, Wigtownshire, Scotland; an incident that resulted in its forced retirement.

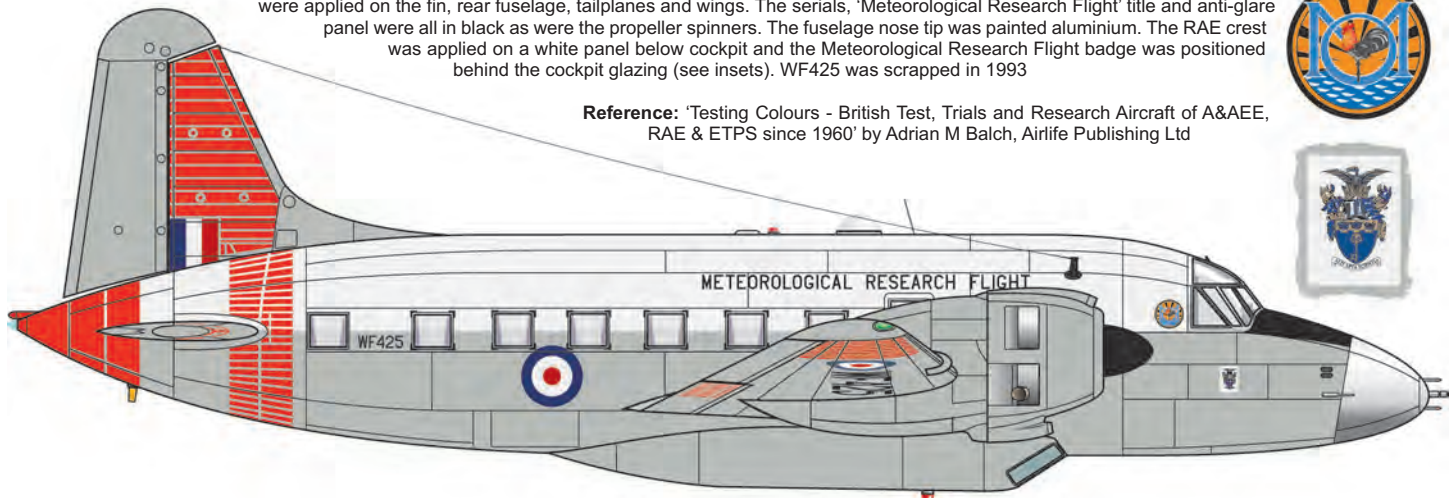
Reference: 'Testing Colours- British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch



Vickers Varsity T.1, WF425, Meteorological Research Flight, RAE Farnborough, June 1974

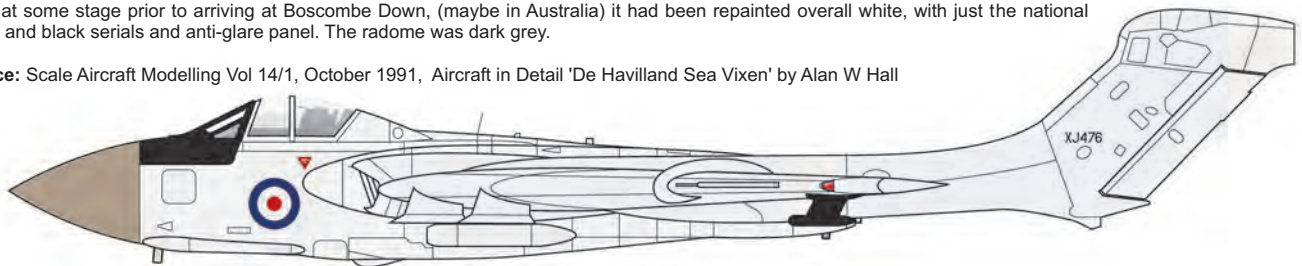
For many years the UK's national meteorological service maintained the Meteorological Research Flight (MRF) based at the RAE at Farnborough using a number of aircraft, which performed a wide variety of measurements, including this Varsity T.1. Built in 1952, WF425 was finished in a Light Aircraft Grey overall scheme including the fuselage, fin, rudder, wings, tailplanes, engine nacelles and cowlings, with just the upper fuselage decking in white. 'Fabglo' strips were applied on the fin, rear fuselage, tailplanes and wings. The serials, 'Meteorological Research Flight' title and anti-glare panel were all in black as were the propeller spinners. The fuselage nose tip was painted aluminium. The RAE crest was applied on a white panel below cockpit and the Meteorological Research Flight badge was positioned behind the cockpit glazing (see insets). WF425 was scrapped in 1993

Reference: 'Testing Colours - British Test, Trials and Research Aircraft of A&AEE, RAE & ETPS since 1960' by Adrian M Balch, Airlife Publishing Ltd

**De Havilland Sea Vixen FAW.1, XJ476, Aircraft & Armament Experimental Establishment (A&AEE) Boscombe Down, June 1974**

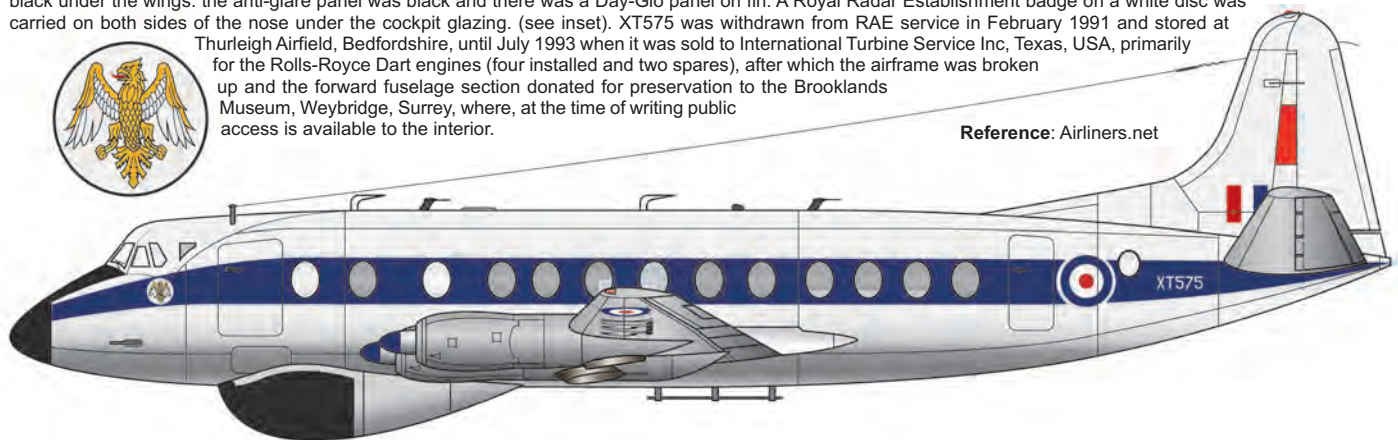
XJ476 was one of the first batch of pre-production Sea Vixens and spent part of its life at the Woomera ranges in Australia, before returning to Boscombe Down to be used as a test aircraft on the Red Top missile programme. Probably originally delivered in its original Royal Navy Extra Dark Sea Grey and white scheme, at some stage prior to arriving at Boscombe Down, (maybe in Australia) it had been repainted overall white, with just the national markings and black serials and anti-glare panel. The radome was dark grey.

Reference: Scale Aircraft Modelling Vol 14/1, October 1991, Aircraft in Detail 'De Havilland Sea Vixen' by Alan W Hall

**Vickers V.837 Viscount, XT575, Royal Radar Establishment, Pershore, Worcestershire, July 1974**

First flown in February 1960, XT575 was originally operated by Austrian Airlines as OE-LAG 'Franz Schubert', and served as a civil airliner with this airline and TABSO (Bulgarian Civil Air Transport) until it was sold to the Ministry of Aviation and then onto the RAE in the 1960s, where it was modified for radar development trials and fitted with a large ventral fuselage radome forward of the wing for Nimrod ASW electronic trials. Finished in overall aluminium, including the wings, nacelles and tailplanes, with white upper fuselage decking, fin and rudder, it had Roundel Blue trim around the cabin windows. Serials were white on the blue rear fuselage trim and black under the wings. The anti-glare panel was black and there was a Day-Glo panel on fin. A Royal Radar Establishment badge on a white disc was carried on both sides of the nose under the cockpit glazing. (see inset). XT575 was withdrawn from RAE service in February 1991 and stored at Thurlough Airfield, Bedfordshire, until July 1993 when it was sold to International Turbine Service Inc, Texas, USA, primarily for the Rolls-Royce Dart engines (four installed and two spares), after which the airframe was broken up and the forward fuselage section donated for preservation to the Brooklands Museum, Weybridge, Surrey, where, at the time of writing public access is available to the interior.

Reference: Airliners.net

**Folland Gnat T.1, XP505, Aero Flight Systems, RAE Bedford, July 1974**

XP505 first flew on 21st September 1962 and began its career with the manufacturers, on loan from the Ministry of Aviation (MoA), entering RAF service with the CFS in February 1966 but went back to MoA charge in April and returned to Hawker-Siddeley at Dunsfold. In January 1969 HS sold XP505 to the Ministry of Technology and was sent to the A&AEE at Boscombe Down for a few weeks 'before being overhauled at Bitteswell and allocation to RAE Bedford's 'Aero Flight' where it served on gust and turbulence research. During the mid-1970s, XP505 was finished in Light Aircraft Grey overall with white spine, fin/rudder and Roundel Blue rear fuselage trim and tailplane fillets. It had a black anti-glare panel, and wing and tailplane leading edges. Serials were white on the blue fuselage trim and black underwing, with the fuselage roundels thinly outlined in white. 'Aero Flight BEDFORD' titles on intake were red. XP505 was later being repainted in the 'Raspberry Ripple' scheme, and was not retired until the 1980s, thus becoming the last flying Gnat in UK service. Sold to the Science Museum, XP505 was on display at the Museum's central London site until 1992 when it was moved into obscurity at their out-station at Wroughton, where at the time of writing, it remains to this day.

References: 'A Short Illustrated History of the Royal Aerospace Establishment Bedford' by Arthur Pearcy; Scale Aircraft Modelling Vol 8/2 November 1985



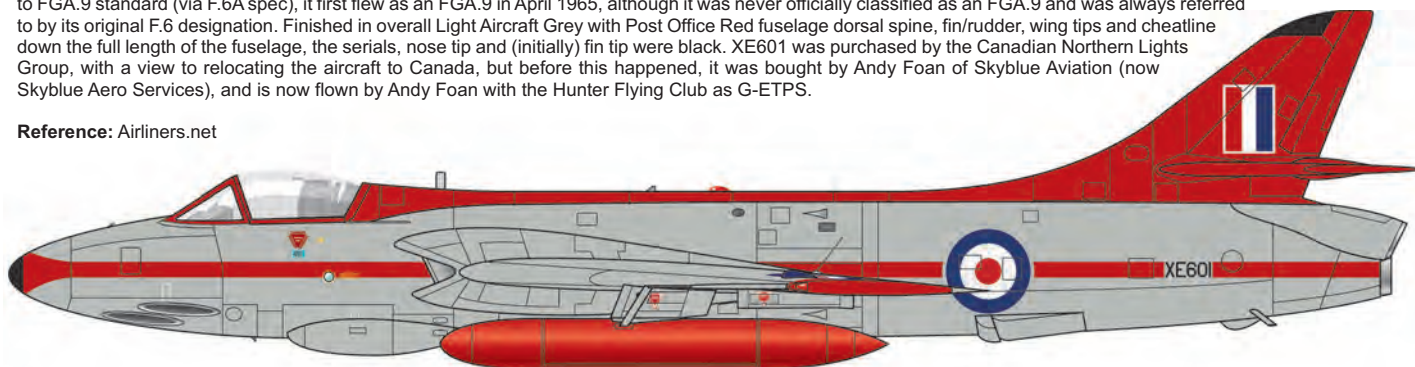


Above: Hunter F.6, XE601, (upgraded to FGA.9 although never officially redesignated as such), spent most of its service life operated jointly by the ETPS and A&AEE in several trials, including simulated biological warfare for which two special spray tanks were carried on the inner pylons, although the underwing tanks in this photo are thought to be smoke generators. This photo was probably taken in the early 1990s, although still in the Light Aircraft Grey and red scheme. At a later stage of its life, XE601 was repainted in the 'Raspberry Ripple' colour scheme. XE601 was finally retired at Boscombe Down in July 1999.

Hawker Hunter F.6 (modified to FGA.9 standard), XE601, Empire Test Pilots School, A&AEE Boscombe Down, October 1974

Built in 1956, XE601 never entered RAF service but was retained by the Hawker Aircraft Company as a certification and trials aircraft. Subsequently converted to FGA.9 standard (via F.6A spec), it first flew as an FGA.9 in April 1965, although it was never officially classified as an FGA.9 and was always referred to by its original F.6 designation. Finished in overall Light Aircraft Grey with Post Office Red fuselage dorsal spine, fin/rudder, wing tips and cheatline down the full length of the fuselage, the serials, nose tip and (initially) fin tip were black. XE601 was purchased by the Canadian Northern Lights Group, with a view to relocating the aircraft to Canada, but before this happened, it was bought by Andy Foan of Skyblue Aviation (now Skyblue Aero Services), and is now flown by Andy Foan with the Hunter Flying Club as G-ETPS.

Reference: Airliners.net

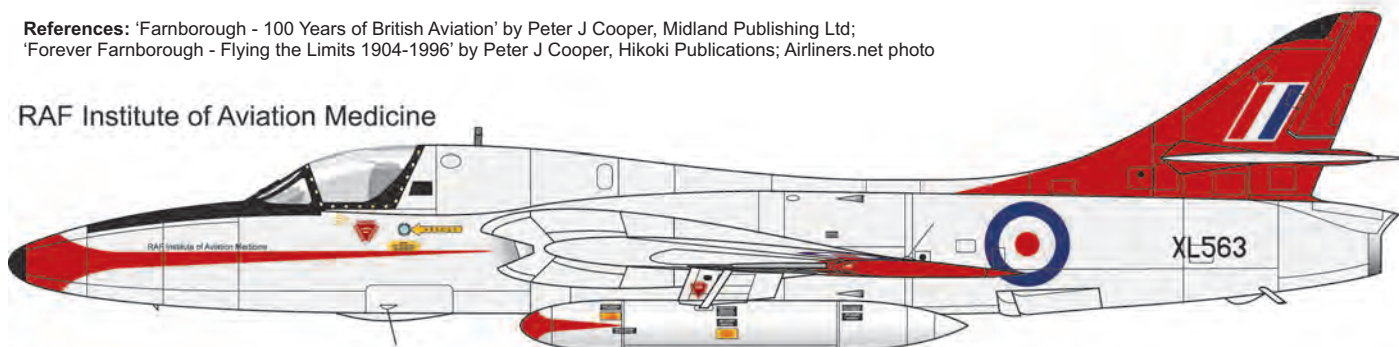


Hawker Hunter T.7, XL563, Institute of Aviation Medicine (IAM), RAE Farnborough, April 1975

Built at Kingston, Surrey, XL563 was the first production T.7 and first flew on 11 October 1957. The earlier part of its service was as a trials aircraft both at Boscombe Down with the A&AEE, and with the manufacturer's, Hawkers, as a support aircraft for the P.1127 VTOL/STOL project during September 1960. Allotted to the Bristol Aircraft Company in January 1961 for use as a chase aircraft in support of the Bristol 188 project to monitor the over water supersonic flight trials, XL563 remained at Filton until January 1963, when it was transferred to Farnborough and taken on charge by the RAF Institute of Aviation Medicine (IAM) in May 1963, under whose name it operated for over 30 years until its retirement in July 1993, having accrued a total of 2,979.40 flying hours. During these years this Hunter performed many varied but essential tasks in undertaking valuable aeromedical flight research on behalf of the IAM. Contrary to popular belief, this aircraft was not on the strength of the Royal Aircraft Establishment (later Defence Research Agency DERA) as it remained with IAM, although it was occasionally used by, and flown by, RAE pilots for trials or continuation training work. Finished in overall white with Post Office Red fin/rudder, nose flash and wing tips, the anti-glare panel, canopy framing, nose tip and serials were black. 'RAF Institute of Aviation Medicine' title was also in black (see inset). Drop tank pylons were in Light Aircraft Grey. Two years later in 1977, XL563 was repainted in the 'Raspberry Ripple' scheme. From August 1993 XL563 was used for valuable engineering training work prior to it being stripped of internal equipment ready for its new role as a ground display aircraft on the lawns outside the Officers Mess at the eastern end of Farnborough airfield. On display for some years, in late March 1999, XL563 was dismantled and moved to Kempston near Bedford, to be returned to flying condition, but this fell through, and the aircraft was moved to premises in Southmoor, near Oxford, where it remained in outside storage in a dismantled condition until it was transported to the Farnborough Air Sciences Trust (FAST) Museum premises in December 2014, where, at the time of writing, it awaits re-assembly and refurbishment by a team of dedicated volunteers

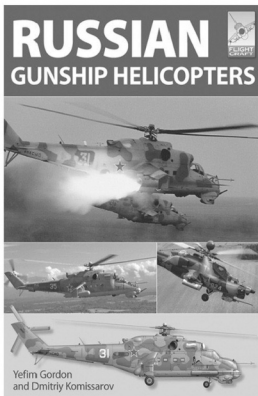
References: 'Farnborough - 100 Years of British Aviation' by Peter J Cooper, Midland Publishing Ltd;
'Forever Farnborough - Flying the Limits 1904-1996' by Peter J Cooper, Hikoki Publications; Airliners.net photo

RAF Institute of Aviation Medicine





The aim of this innovative new series is to provide model-makers and aircraft enthusiasts with a new standard of primarily visual reference to both full size aircraft and their models, using detailed line drawings, plans, profiles and photographs, many in full colour. The series will provide colour reference for paint schemes, summaries of design histories and careers, and critical reviews of available kits. Each book is devoted to an iconic aircraft type - chosen for its popularity as a modelling subject showcasing the best of the world's aircraft types and providing invaluable insight and guidance to model-makers.

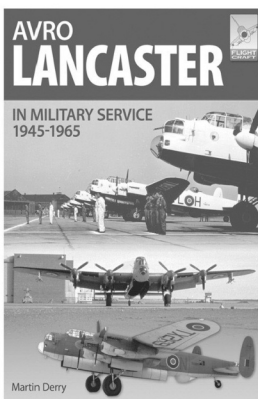
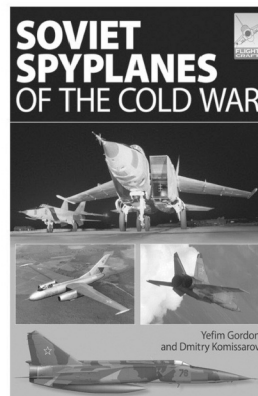


RUSSIAN GUNSHIP HELICOPTERS

This publication deals primarily with the three principal attack helicopters of the present-day Russian Army: the Mil MI-24 'Hind', the Mil-28 and the Kamov Ka-52 'Alligator'. Well-illustrated histories and structural analyses are supplemented with detailed descriptions of the various plastic scale model kits which have been released, along with commentary concerning their accuracy and available modifications and decals.

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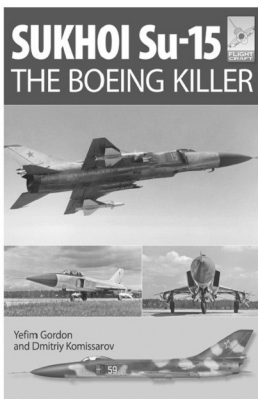
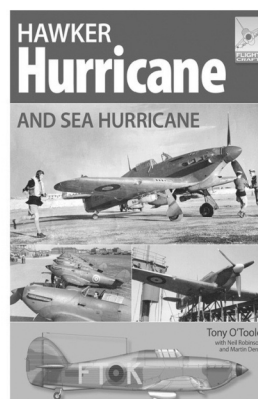


AVRO LANCASTER

The Avro Lancaster, such a stalwart of the skies during the Second World War, also enjoyed an interesting and surprisingly colourful post-war career. It is this era that the authors have chosen to focus on here, by profiling the type across its many variants.

HAWKER HURRICANE

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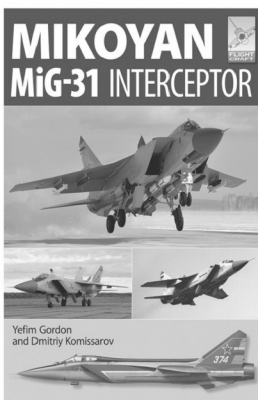
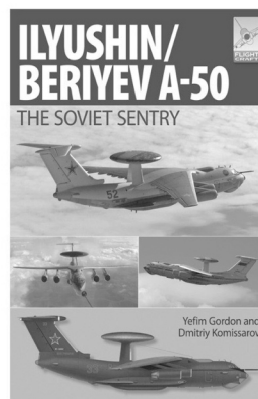


SUKHOI Su-15

First flown in May 1962, the Su-15 officially entered service in 1965 and was built in several versions, the late ones having cranked-delta wings and a more capable radar. This book describes the full developmental and service history of the Sukhoi-Su-15, containing a comprehensive survey of all model-making kits currently available on the market.

ILYUSHIN / BERIYEV A-50

Brought out in the late 1970s as a successor to the obsolete Tu-126 airborne early warning aircraft, the A-50, co-developed by the Il'yushin and Beriyev bureaux, is one of the most interesting military variants in the field of IL-76 military transport. This book describes the A-50's thrilling developmental history, taking in its many variants (including the A-50EI export model for India).

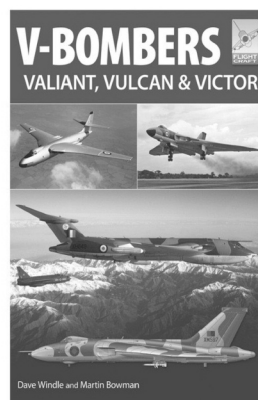


MIKOYAN MiG-31

The MiG-31 started life as an advanced derivative of the famous MiG-25P interceptor, becoming the first Soviet fourth-generation combat aircraft. The book describes its full developmental history, including upgrade programmes, and features a full and comprehensive survey of the various MiG-31 modelmaking kits currently available on the market.

V-BOMBERS

The Vickers Valiant, Vulcan and Victor saw prolific and varied service during the course of their careers. This book contains fabulous colour profiles (created by Dave Windle) of all three types in different operational modes, configurations and colour schemes.



British Military Test and Evaluation Aircraft The Golden Years 1945 - 1975

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Above: It seemed only fitting to have one of the best known post-war British fighters represented on the back cover, and in keeping with the Test and Evaluation theme of the book, what better than a P.1B pre-production example, XA847, one of three prototype P.1Bs, (the others being XA853 and XA856), which were produced prior to the series production of the English Electric Lightning. [See FlightCraft 11 'English Electric Lightning']. The company also produced twenty P.1B pre-production examples (XG307-XG313 & XG325-XG337) – four more airframes than the total number of production Lightning F.1s! XA847 is seen here at Binbrook, prior to its eventual restoration. In May 1963, XA847 had been fitted with a leading-edge fin extension for aerodynamic research which in the event wasn't fitted to production Lightnings. Earlier still, on 25 November 1958, XA847 had become the first British aircraft to fly at Mach 2 and subsequently carried a plate on the fuselage recording the fact. [Fred Martin Collection]

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